COPY #1

(IPR) 10785 / October 2002
Sponsor Review Version

Assessing NDMS Response Team Readiness: Focusing on DMATs, NMRTs, and the MST

Rosemary Speers • Ted Jaditz
Monica Giovachino • Deborah L. Jonas

DO NOT COPY

The CNA Corporation

A Non-Profit Research and Analysis Corporation

4825 Mark Center Drive • Alexandria, Virginia 22311-1850 • (703) 824-2000 • (703) 824-2942 FAX

Contents

Summary

The Assistant Secretary for Public Health Emergency Preparedness (formerly the Office of Public Health Preparedness) within the Department of Health and Human Services (HHS) asked the CNA Corporation to conduct a readiness assessment of the National Disaster Medical System (NDMS), which is managed by the Office of Emergency Response (OER) (formerly the Office of Emergency Preparedness). This assessment is focused specifically on Disaster Medical Assistance Teams (DMATs), National Medical Response Teams (NMRTs), and the Management Support Team (MST). Our key findings are as follows:

- **Current guidelines for DMATs are not well matched to actual missions.** The original concept for DMATs was to respond during a natural disaster, assembling a 35-member team with equipment to operate autonomously for up to 72 hours. DMATs now have new missions—notably as a responder to terrorist incidents and pre-staging for special events. The new missions create requirements for expertise mix, equipment, and training that are very different from historical patterns. Available standards and data do not capture readiness for the new missions.
- **The Office of Emergency Response (OER) lacks data to completely assess readiness.** Readiness assessment requires comparing data to performance standards. OER does not systematically compile the necessary information, nor has it developed the overall standards required to assess whether DMATs, NMRTs, and the MST are ready for their missions.
- **Partial readiness assessments based on OER administrative data disagree with the picture derived from the teams.** When we compare OER administrative data to published and unpublished OER standards, we find that no team meets deployment requirements. Based on information we gathered from the

teams, we find that 16 out of 28 teams meet requirements to deploy 35 members in the traditional mission.

- **All DMATs are fulfilling missions different from the advertised capabilities.** Regardless of whether they meet the requirements for the full 35-member deployment, all operational DMATs have deployed in the last 3 years. While a few DMATs continue to send large groups to be first at the scene, all operational teams have deployed as strike teams, follow-on teams, or answered OER requests for personnel with specific skills.

Can DMATs do the advertised mission?

DMATs were originally intended to deploy to augment local health care infrastructure. They are designed to deploy 35-person teams that conduct triage, perform primary care in austere conditions, and prepare more seriously injured patients for evacuation [1].

Evaluating readiness means comparing team resources and capabilities to standards and requirements. OER appears to have no formal system of readiness evaluation. Administrative data lack details necessary to allow a definitive evaluation of whether teams have the personnel and equipment necessary to deploy. OER does not track data necessary to evaluate teams' capabilities in communications and transport, and has incomplete information on their training status. In addition, OER doctrine has few standards for evaluating whether a team is ready to perform its mission. Existing standards focus only on personnel and equipment, and most are phrased as recommendations rather than requirements.

OER's administrative data indicates poor system readiness. Most teams fail one or another of OER's personnel standards. The data indicates that no team has a complete equipment cache. However, data we collected from teams suggests that most (16 out of the 28 operational teams for which we collected data) have the equipment and personnel to deploy. While OER data disagrees with the teams about which teams are ready to deploy, there is a very significant reservoir of capability that is available to respond in an emergency.

Are DMATs actually doing the advertised mission?

Only 15 operational DMATs have deployed a full 35-member team in the last 5 years. Over this same period, all DMATs participated in deploying smaller groups more than 200 times, as strike teams or small groups of specialists. The mission of pre-staging for special events has dominated in recent years.

Corresponding to the changes in NDMS missions, changes in DMAT deployments are also evident. While these smaller scale deployments are becoming the norm, OER has neither relevant doctrine nor standards. Teams cannot train or prepare for these missions, and OER cannot assess readiness to accomplish them.

Issues affecting readiness

OER does not manage deployments to maximize system capability

OER shows strong preferences for which teams it chooses to deploy. Certain DMATs deploy as "full" teams regularly. Other teams rarely deploy with both personnel and equipment; instead, they function more frequently as "second-wave" teams that use the equipment of the first team after it leaves the scene. OER also does not follow its own rotation schedule when deciding which teams to deploy. Teams that are on advisory are often bypassed for deployment. Some teams are deployed much more frequently than others, whether they are on advisory or not.

Whether teams get to deploy is a primary factor in maintaining team readiness, and future readiness will be favorably affected by current deployment. Being chosen to deploy is the reward for DMATs and their volunteer personnel. To ensure that all team members have a useful role to perform, they need to feel that they are a part of the system, and that they have the opportunity to use their skills. Deployments also provide ongoing training, both individually in the skills needed to perform the tasks and as a team working together at the scene.

OER data and standards are not sufficient to allow adequate readiness assessment

Readiness assessment requires both collecting hard data and making informed judgments. By focusing only on information relevant to management of the system and not on what the teams need to fulfill their missions, OER does not systematically compile the information necessary to assess whether DMATs, NMRTs, and the MST are ready.

There is also more to the picture than team readiness. To successfully accomplish a mission, OER command and control assets must interact with the team, and the logistics functions must resupply the unit once it is in the field. On some deployments, several teams work together to accomplish the mission. All of these facets should be evaluated in a readiness system. Teams do not deploy in a vacuum.

Tension between teams and management is aggravated by system practices

For example, teams never train with the MST. In fact, there is no training for MST personnel other than what they receive on actual deployment. While the capabilities of the MST and the training they should receive is documented, none of this training actually takes place. All teams report issues with OER paperwork—membership applications, ID cards, reimbursements, and compensation. A fine line exists between providing too much specific procedural guidance and offering teams the opportunity to remain flexible and meet requirements in their own way.

Recommendations

We recommend that OER implement improvements in three major areas:

1. **Doctrine and standards.** The segment of NDMS that includes DMATs, NMRTs, and the MST lacks sufficient doctrine and policy guidance. The few standards and guidelines that do exist are often not relevant to the current missions that NDMS response teams are asked to fulfill. Consequently, there are lim-

ited procedures available to assess readiness. Improving doctrine and standards should include preparing a vision for the future of NDMS response teams.

2. **Capability management.** OER needs to develop better management practices to maintain the capabilities that currently exist. DMATs and NMRTs have fulfilled a vast number of missions in a variety of ways. These are capabilities that need to be coordinated and monitored.

3. **Performance measurement.** OER needs to improve its ability to measure system performance. Improving its information technology and instituting better communications with teams will enhance the ability of OER to track system status. OER should establish a readiness assessment tool to programmatically track this information and provide feedback to system managers. This report provides a framework and starting point for OER to develop this tool.

Introduction

Background

Under the Federal Response Plan (FRP), the Office of Emergency Response (OER) within the Department of Health and Human Services (HHS) is the lead agency for carrying out Emergency Support Function 8 (Health and Medical Services) of the FRP.

The National Disaster Medical System is a federally coordinated system that augments the Nation's emergency medical response capability. The NDMS agency partners include HHS, the Department of Defense (DoD), the Department of Veterans Affairs (VA) and the Federal Emergency Management Agency (FEMA). NDMS has three objectives:

- Medical response to peacetime disasters
- Patient evacuation back to the United States from oversees armed conflicts
- Treatment of evacuated patients [1].

OER is the lead agency responsible for managing the medical response portion of NDMS. It does this by operating several types of volunteer medical response teams:

- Disaster Medical Assistance Teams consist of groups of medical and support personnel designed to provide emergency medical care during disasters or other unusual events
- National Medical Response Teams are specialized nationally deployable teams that provide medical services, decontamination services, and other support in a hazardous material environment

- The Management Support Team provides administrative and operational support to deployed response teams
- Additional teams provide specialized medical, veterinary, and mortuary support.

When there is a disaster, FEMA, as the Nation's consequence management and response coordinator, tasks HHS to provide critical services, such as health and medical care, that may be needed in the affected area. OER, as the Secretary's action agent, will direct NDMS to assist in providing the needed services. This may include deploying response teams. In addition, OER might use the Public Health Service's Commissioned Corps Readiness Force (CCRF), and other federal resources, to assist in providing the needed services [2].

Tasking

The Assistant Secretary for Public Health Emergency Preparedness (ASPHEP) within HHS asked the CNA Corporation to conduct a readiness assessment of the NDMS focused specifically on DMATs, NMRTs, and the MST. The primary goals of this project are the following:

- Assess the current process used to define the readiness status of NDMS both for individual teams and for the national system as a whole
- Assess the current readiness of DMATs, the MST, and NMRTs in terms of resources (personnel, equipment, training)
- Assess whether existing plans, policies, and directives provide adequate guidance to teams in the completion of their missions
- If necessary, devise readiness metrics that provide an accurate picture of current NDMS response capabilities.

Approach

We reviewed OER policy documents and directives as they pertain to NDMS team deployment and required capabilities. We conducted interviews with key OER personnel to better understand current

approaches used to assess NDMS readiness. We also reviewed existing reports relating to NDMS capabilities and readiness, and examined the way other government agencies assess the readiness of their components.

Based on this initial data gathering effort, we designed the analytical framework that we used to address the key issues and developed a data collection scheme to obtain information from the teams. We then conducted data gathering meetings with OER and with all operational DMATs and NMRTs.

Organization of this report

We will begin this report with a primer on readiness reporting. The next three sections discuss the readiness of each of the three types of teams we were asked to focus on: DMATs, NMRTs, and the MST. The following section describes a specific example of how all three response teams might be used for a new NDMS mission. The section after this provides the framework for developing a readiness reporting system, and the final section outlines our key findings and recommendations.

Measuring readiness, managing readiness: A primer

This section begins with a discussion of how organizations measure readiness. We illustrate with examples from the Department of Defense and the Coast Guard. We then sketch how some of these ideas can be applied to OER.

Though perhaps not apparent initially, DoD can be a useful model for OER. Individual services within DoD face the similar problem of preparing their organizations to be ready for infrequent calls to perform their primary duty. Like OER and its teams, large parts of DoD organizations have never had to perform their intended mission. The Services have put a great deal of effort into studying the problem of how to prepare for and measure readiness. Many of their ideas can be applied here.

The purpose of readiness reporting is to serve the decision-maker. Readiness measures communicate information about the current status and capabilities of the system. The system should therefore be designed so that it is in everyone's interest to make correct and informative reports. In the Armed Services, some commanders feel that a poor readiness report will have poor consequences for their military careers. Thus, it is thought that, on average, readiness reports overstate unit readiness. If true, this reduces the utility of the report to decision-makers.

Some things can be done to correct this. For example, reports should capture data rather than judgments. Readiness should be assessed against objective standards. The level of readiness ought to be calibrated against resources available. Management must take care to see that the system is viewed as a measurement tool, not a report card for managers.

Introduction to unit readiness reporting

All branches of the Armed Services report unit readiness using a framework that was first developed by the Army in the early 1960s. The approach is fairly straightforward. Although it does not provide the decisionmaker with a complete picture of system readiness, we view it as a useful starting point.

The current DoD readiness measurement system is called GSORTS, the Global Status of Resources and Training. GSORTS is a methodology that unit commanders use to fill out readiness reports.

Each month, the commander rates his or her unit in each of four resource areas: personnel, equipment, supply, and training. Ratings are on a scale of one to four, where one indicates that the unit is ready to perform its intended mission, and four indicates that the unit is *not* ready to deploy. The overall unit rating is calculated from the ratings on the four resource areas. (Some exceptions are allowed, but typically the unit rating is the worst rating of the four area ratings.)

To obtain a rating for a resource area, the commander compares available resources to a requirements list. Consider, for example, equipment ratings. Figure 1 is a selection from the Table of Equipment (TOE) for an Army Chem/Bio detection company.

Figure 1. Selection from the U.S. Army modified table of equipment

Chemical Company (Bio Det)

Item Description	Required
...	
KY-99 MINTERM	42
MASK CHEM BIO XM40	165
MASK CHEM BIOLOG M43A1	6
PHONE WIRE MX-10891/G	2
PWR SUP PP-4763/GRC	1
RADIO SET AN/VRC-90A	3
RADIO SET: AN/VRC-90F	77
TANK LIQ DISP TRLR MT	1
TLR CGO 5T MTV	1
...	

The TOE lists all equipment that the unit is supposed to have available to deploy. Commanders compare inventories to this list and score their units based on how much of the required equipment is in fact on hand. Commanders read their readiness level from a table in the GSORTS instruction (figure 2).[1]

Figure 2. A table from the U.S. Army GSORTS instruction

Table 5–1
Equipment-on-hand criteria (high-density individual LINs, 21 or more items, includes pacing items)

Level	Equipment	Aircraft
1	100–90%	100–90%
2	89–80%	89–80%
3	79–65%	79–60%
4	64% and below	59% or below

The GSORTS score for equipment is analogous to a report card. The unit gets an A, B, C, or F on the report card, depending on the fraction of required equipment that is on hand.[2]

The basic methodology is applied to each readiness area. For personnel, the unit commander compares personnel on hand to the billet authorization (the number and types of personnel required) for his or her unit. To rate supply, the commander inventories stocks of expendable resources and compares that to the standards for the

1. In practice, the report is a bit more complicated than this. Commanders must track separately certain key items or classes of items, and some items receive more weight than others. However, the basic methodology is the same for each category or class of equipment.

2. There is a fifth readiness reporting category. Level 5 corresponds to the unit being in overhaul. There, the unit has been ordered to conduct maintenance or reorganization that would prevent it from being able to deploy until the activity is completed. For example, a dry-docked ship would report readiness level 5. An analogy for a DMAT might be rebuilding the cache after returning from deployment.

unit. For training, each unit has a requirement for the content and frequency of training events. The commander compares the listing of recent events to the training requirements for the unit. In each case, the score is determined by what fraction of the required resources are on hand, or what fraction of the required training has been accomplished within the specified time frame.

It is easy to apply this approach to assess DMAT readiness. For example, OER has a requirement for the equipment cache, and requires teams to report on-hand inventory relative to the requirement. Elsewhere in the report, we use this information to gain insights into equipment readiness. In addition, OER has personnel staffing requirements. Again, we compare these requirements to the membership database to gain some insight into personnel readiness.

While appealing for its simplicity, this approach provides an incomplete picture of overall system readiness. Indeed, we strongly recommend that OER not stop here in its readiness assessment system.

One problem with this approach to unit readiness is that it is focused entirely on the team. Teams do not deploy in a vacuum. To successfully accomplish a mission, OER command and control assets must successfully interact with the team, and the logistics functions must successfully resupply the unit once it is in the field. On some deployments, several teams work together to accomplish the mission. None of these capabilities are assessed with the basic methodology. Focusing on the team, therefore, does not provide a decision-maker with a complete readiness assessment.

A second problem with this approach is that it may not answer the question the decision-maker is asking. Requirements lists tell us what the unit needs to accomplish the mission for which it is designed. For DMATs, the cache list tells us what a DMAT needs to operate in the field for 3 days, providing primary care in an austere environment. Personnel requirements tell us what is needed to staff an aid station around the clock.

One might argue that OER requirements represent the most severe test of DMAT capability, and that if the team can meet that requirement, then it is certainly ready for a lower intensity event. In general,

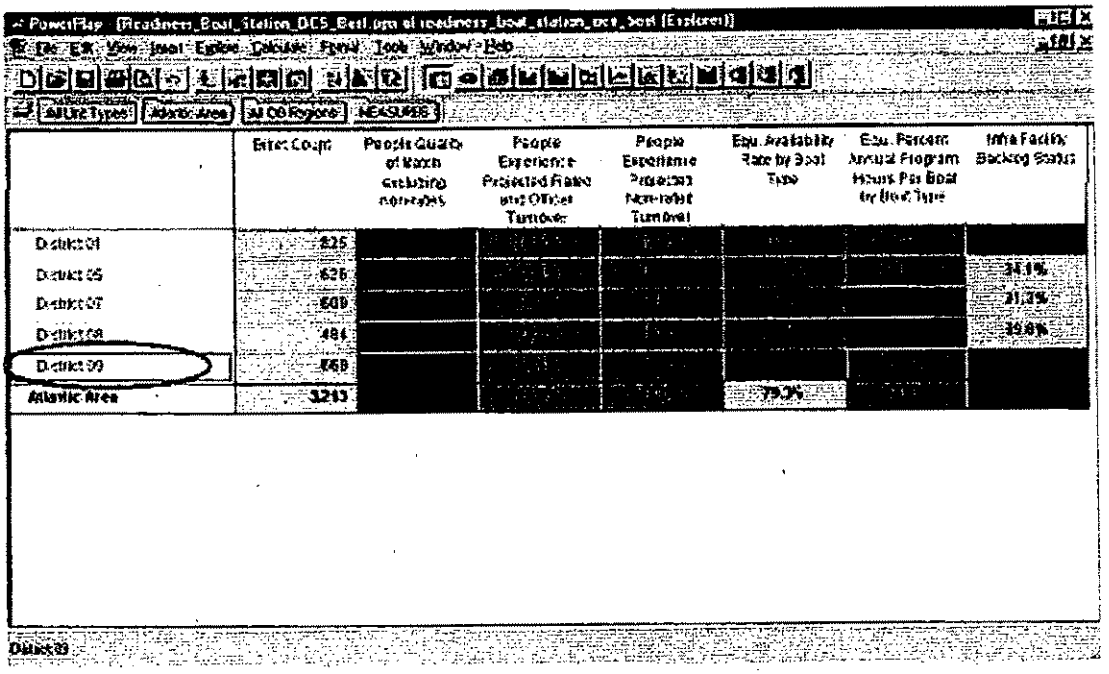
this reasoning is not correct. A team that is fully equipped for the high-intensity mission may not be ready for the low-intensity mission. Low-intensity deployments place different demands on units, and not necessarily lesser demands. We often observe heavy demands on key assets that can strain a system or prevent units from being able to respond effectively to other, high-intensity contingencies.

For example, consider the deployments in support of efforts to curb the 2002 outbreak of avian influenza in Virginia. Deployments typically constituted a small fraction of total team membership. The most heavily called on team was RI-1, which deployed 16 members. However, those 16 members included 9 paramedics. To put this in perspective, OER requires only 4 paramedics as part of a standard 35-person deployment, and requires an operational DMAT to have only 9 on its entire roster. Even though the avian flu deployment was small relative to the size of the team, it placed a relatively heavy burden on key segments of the team.

Finally, simple ready-or-not reports hide information from the decision-maker. A unit that cannot meet its design requirements may still be useful for some types of missions. If the team lacks the equipment or personnel to staff a classical DMAT aid station, it may still have the personnel and equipment to be useful in other contexts. Indeed, OER quite often deploys strike teams or partial teams, or places calls for specific specialists. Basing deployment decisions on the design standard may result in pessimistic views of system capability.

Managers need not stop with yes/no readiness reporting. For example, Coast Guard managers have access to a range of indicators of system and unit performance. Figure 3 is a screen shot from a recently developed Coast Guard readiness system. From the figure, note that managers have access to extensive summary statistics describing personnel, equipment, and infrastructure status. Color coding indicates at a glance whether the summary statistics meet standards, are a cause for concern, or outright fail standards. This information is part of a database system that allows managers to drill down into the readiness information supplied by individual stations. Readiness measures are archived so that managers can benchmark current performance against historical norms.

Figure 3. Example of Coast Guard readiness system



Capability-based reporting: Mission-essential tasks

One trend in readiness reporting is to report unit status to complete various *mission-essential tasks.* Rather than reporting overall readiness for the design mission, a unit reports readiness for each of a list of essential tasks that it might have to accomplish.

To illustrate how this might be done, figure 4 is a listing of essential tasks that a DMAT might be required to perform as part of three different types of missions. Some of these tasks appear in all three missions, while some do not.

We could consolidate this table to generate a list of all of the essential tasks that we might ask of a team, as in figure 5. If a team reports its readiness to perform each of these tasks, system managers then know which missions the team is ready to perform, and which missions it is not ready to execute.

Figure 4. Sample mission essential tasks

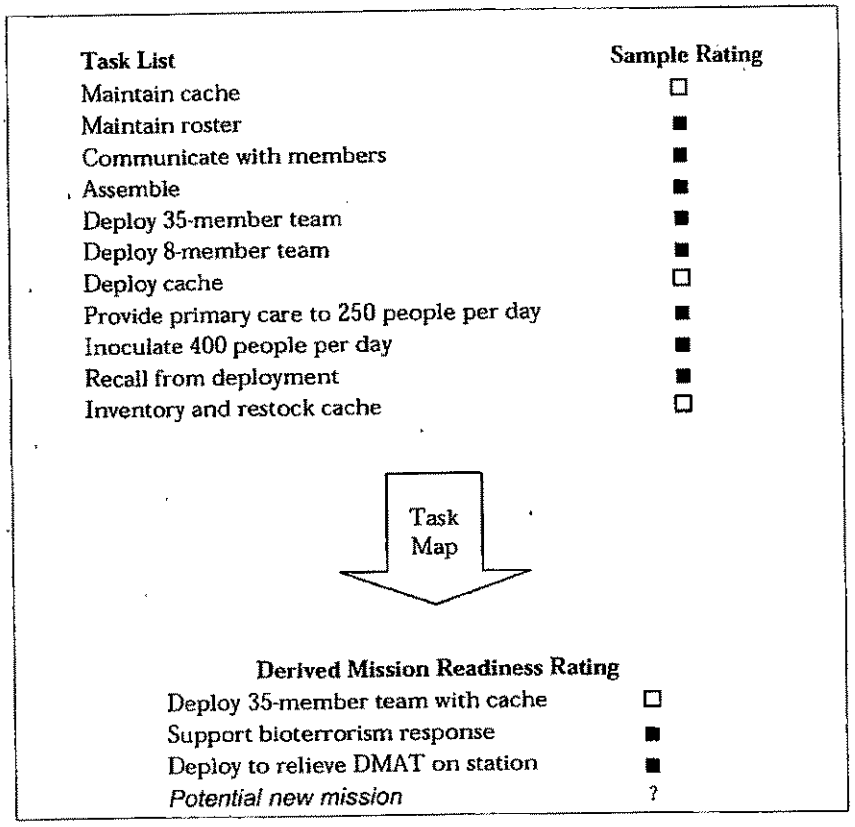
Possible DMAT missions

Deploy 35-member team with cache	Support bioterrorism response	Deploy to relieve DMAT on station
•Maintain cache	•Maintain roster	•Maintain roster
•Maintain roster	•Communicate order to deploy	•Communicate order to deploy
•Communicate order to deploy	•Assemble	•Assemble
•Assemble	•Deploy 8-member strike team	•Deploy 35-member team
•Deploy 35-member team	•Inoculate 400 people per day	•Provide primary care to 250 people per day
•Deploy cache	•Recall from deployment	•Recall from deployment
•Provide primary care to 250 people per day		
•Recall from deployment		
•Inventory and restock cache		

Additional ways this information can be useful to the decision-maker follow:

- In times of system stress, the decision-maker can use it to deploy teams efficiently, to maximize the total missions performed using the available resources.
- The information here can be used to help identify system bottlenecks and problem areas, where additional resources can have the greatest impact on system capability.
- The decision-maker can assess readiness for new missions, with little or no additional reporting. If a new mission can be mapped to the task list, the decision-maker can assess readiness for it.

Figure 5. Consolidated task list



Scenario assessment

Flexibility in a readiness reporting system is a very important feature. It is not realistic to expect planning to cover all contingencies. Thus, the decision-maker is likely to encounter scenarios that are not in any planning guidance or assessment. Readiness reporting should be designed to accommodate this uncertainty.

The solution lies in designing the system to allow decision-makers to ask "what if" questions. A flexible system collects and archives summary information describing the status of the system. Users then work to identify business rules that allow rapid analysis of the data.

For example, scenario systems in use by the military start with a listing of the location and condition of relevant resources—personnel, supplies, transportation assets, and the like. A scenario is specified as a mission to deliver a specific package of resources to a specific location. In the most elaborate systems, computer simulations "execute" the scenario: business rules are used to simulate transport networks, given the condition and number of available transportation assets—roads, trucks, aircraft, rail lines, and ships. Simulations then identify whether the system can meet targets for the movement of equipment from location to location, and identify specific facilities and resources that limit system throughput. Planners can re-run the simulation to assess the efficacy of potential solutions.

Such elaborate systems are probably not cost-effective for OER. However, it is certainly worth designing data collection and archives to accommodate future use in scenario systems.

Readiness: The systems approach

The CNA Corporation was tasked to study DMAT, MST, and NMRT team readiness. Note that team readiness may not be the limiting factor in assessing system capability. In order to accomplish a mission, several players must work together in concert: OER, the MST, and the teams themselves. If any part of the system fails, the overall mission may not be accomplished. There appears to be little or no effort to monitor readiness of two legs of this three-legged stool.

A readiness system entails accomplishing the following steps:

- Identify the mission-essential tasks that must be accomplished to execute the mission. These will include tasks at the team level, at the MST level, and at the OER level.
- For each task, identify the "inputs" that are required to accomplish the task. What personnel, equipment, and other enablers are required at each step?
- Set up the training system to exercise the critical skills. One critical skill is coordination—teams working together or parts of

the system interacting with other parts. There are currently no exercises or events that focus on these coordination skills.

- Collect and archive data. Changes in system readiness occur slowly. It is important to maintain records that allow one to identify trends in system capability.

Current OER data systems and metrics do not accomplish these tasks. As a consequence, it is difficult to assess the readiness of many parts of the system.

How we assessed readiness

Readiness assessment requires collecting both hard data and making informed judgments. OER does not systematically compile the information necessary to assess whether DMATs, the NMRTs, and the MST are ready for their missions. Thus, our assessment is limited by the available data.

We used available OER administrative data on equipment and personnel to compile quantitative readiness indicators that measure whether teams met the standards promulgated by OER. There are two problems with this approach. First, much of this administrative information is of uncertain reliability, so it is not clear we have a realistic picture of system readiness. Second, OER standards are not well developed. We used personnel requirements from a draft version of the team manual [3]; standards were edited out of the final version. Equipment standards are a moving target. For FY 2001, teams reported inventory relative to cache list 11; in September 2002, OER is finalizing cache inventory list 17. Third, there are no administrative data that would allow one to measure readiness to perform mission-essential tasks. Therefore, these measures are both noisy and incomplete indicators of system readiness.

The CNA Corporation analysts conducted site visits with most teams, and conducted phone conversations with team leaders of several additional teams. After the site visits were completed, analysts discussed their findings and rated team readiness. Ratings were based on visit notes, analyst impressions, and data collected from the teams augmented by follow-up communications with the team leaders.

These judgmental ratings are necessarily less systematic and less complete than a formal readiness assessment system.

The findings we discuss in subsequent chapters do not constitute a full and comprehensive readiness review. However, our quantitative indicators and qualitative judgments seem to agree at least in a broad sense. Briefly, we find that, even though there are systematic readiness issues, there is a substantial reservoir of capability within their volunteer system.

Disaster Medical Assistant Teams

Most of our analysis focuses on the DMATs, the largest portion of the NDMS response teams that we were asked to assess. Although the OER administrative data show that many teams don't meet documented standards for personnel and equipment, data collected directly from teams show that most teams are ready. Many of the issues we present here also apply to NMRTs, which are discussed in the next section.

Advertised capabilities

Mr. Claude A. Allen, Deputy Secretary of the Department of Health and Human Services, testified before the Senate Committee on Veterans Affairs on October 16, 2001 [2]. His testimony described the role of HHS's Office of Emergency Preparedness in the Federal Response Plan and described the following NDMS capabilities:

- Seven thousand personnel organized into approximately 70 DMATS, DMORTs, and other response teams
- Twenty-seven level 1 DMATs that can deploy within hours and be self-sufficient on the scene for 72 hours.

The Response Team Description Manual [1] describes the following additional capabilities for DMATs:

- Maintain a roster of qualified personnel 3 deep at each position (see table 1 for the required DMAT positions)
- Deploy to disaster site within 8 hours from the time of alert to deployment from the point of departure
- Deploy with adequate supplies and equipment to support themselves for 72 hours (including food, water, shelter)
- Provide medical care at a fixed or temporary site
- Treat up to 250 patients per day.

Table 1. DMAT position requirements[a]

Position	Required for level 1 DMAT roster	Required for a field response assignment[b]
DMAT Leader	6	2
Administrative/Finance Chief	3	1
Logistics Chief	3	1
Medical Officer	9	3
Pharmacist	3	1
Pharmacy Assistant	6	1
Supervisory Nurse Specialist	6	2
Staff Nurse	21	6
Advanced Practice Nurse or Physician Assistant	12	4
Respiratory Technician	12	
Laboratory Technician	8	
Safety Officer	3	1
Paramedic	9	4
Administrative Officer	3	
Equipment Specialist	3	1
Communication Officer		2
Administrative Assistant		1
Total	107	30

a. Source: NDMS Team Handbook [3].
b. The 30 positions indicated are encouraged or required for a 35-member field response assignment. The 5 additional positions are determined by the DMAT.

What the DMATs have provided NDMS

OER recently changed its system of ranking teams according to levels. Previously, level 1 denoted teams that had the personnel and equipment to deploy to a site and meet the advertised capabilities. Level 2 teams did not have their own equipment caches, but could replace a level 1 team and use their equipment. Level 3 teams had only local response capability and level 4 teams were in the beginning stages of development [4]. OER now classifies teams as being "operational," which is analogous to level 1, or "in development," implying that the teams will eventually obtain operational status.

According to OER, there are now 29 operational DMATs in the NDMS system [5]. These teams have responded to 50 missions since 1997. Several different teams may deploy for the same mission. During this time period:

- Teams (DMAT or NMRT)[3] deployed groups of 30 or more personnel 31 times
  - — Only 15 of the 29 operational DMATs participated in these large group deployments
  - — Examples of missions for these deployments include hurricanes, storms, and special events
- Teams deployed groups of less than 30 members 256 times
  - — All operational DMATs participated in these smaller team deployments
  - — Examples of missions for these deployments are special events (where smaller "strike teams" are sometimes deployed), hurricanes and storms (where DMAT personnel may augment or backfill other teams), and nontraditional missions (such as avian influenza support to USDA in 2002).

Although documented DMAT capabilities are geared toward the 35-member field response unit, DMATs are often deployed in other ways. Many operational DMATs have not deployed a full 35-member team in the last 5 years. However, these teams have provided smaller groups of personnel to respond to numerous NDMS missions.

DMAT funding history

Figure 6 shows the total annual funding appropriated for OER from FY 1998 to the present. While funding for general department management (GDM) has remained fairly steady, emergency funding (which includes funding distributed directly to the teams) has increased significantly in recent years.

3. We are unable to separate DMAT and NMRT deployments (see the appendix).

Figure 6. OER funding history

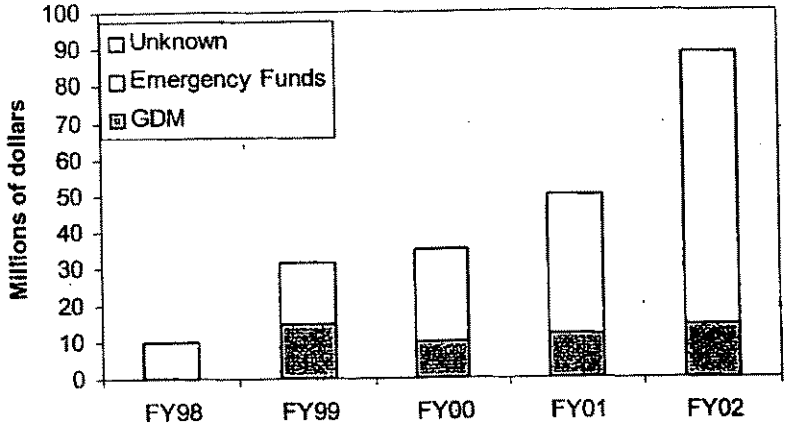
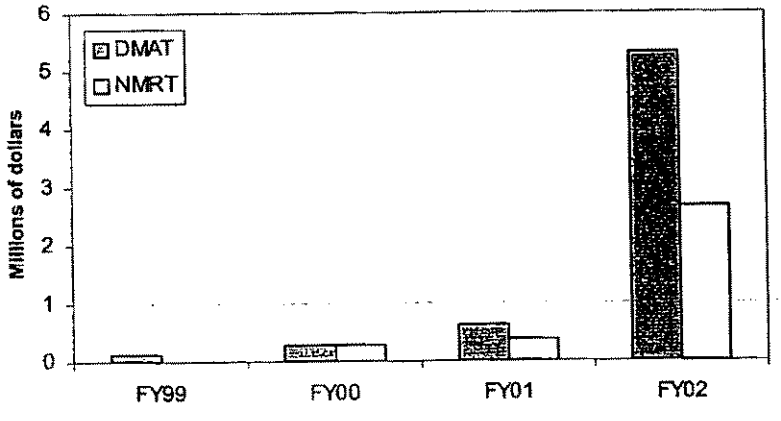


Figure 7 shows funding provided to DMATs and NMRTs since FY 1999. The four NMRTs have received much larger per-team funding allocations. Average per team NMRT funding rose from $70,000 in FY 2000 to $666,000 in FY 2002. Average per-team DMAT funding rose from $6,000 in FY 1999 to $100,000 in FY 2002.

Figure 7. DMAT and NMRT funding history



Can the DMATs meet their advertised capabilities?

Key resources for DMAT readiness

Through our interviews with DMAT team members and our review of NDMS literature, we identified five key resources necessary for a team to be ready:

- *Personnel.* The team must have adequate personnel to deploy to the event.
- *Equipment.* The team must have adequate equipment to perform its mission.
- *Communications.* The team must have a communications system that allows it to quickly notify and recall team members in the event that they are called on to deploy.
- *Training.* The team must have completed the training necessary to allow it to successfully carry out its mission.
- *Transport.* The team must have arrangements in place to quickly transport team members and their equipment to the point of departure.

OER keeps data on team membership and tracks cache inventories. Further, it has personnel requirements and a standard cache list. We can use these administrative data to assess whether teams have personnel and equipment as required under OER guidelines. OER does not have guidelines or track information on communications arrangements or team transportation assets. OER has proposed and withdrawn requirements for online training, does not track team training, and does not track all team exercises. Thus, personnel and equipment will necessarily be the focus of this section. A more complete view of team readiness is not possible because of the lack of data and guidelines against which to compare it.

DMAT personnel readiness according to OER data

As discussed above, the NDMS Team Handbook [3] lists the specific DMAT positions required for a field deployable unit (with 35 team

members) and an operational[4] DMAT roster (which has most required positions filled 3 deep). See table 1 for a list of these personnel. We used the OER membership database to compare these personnel requirements with the rosters of each operational DMAT (see the appendix for a complete discussion of our data sources).

Field deployable unit

According to OER data (table 2), 15 of the 28 operational teams for which we have data have the personnel to form a 35-member deployable team. All teams are able to fill 9 of the 12 required positions. In the table, a circle indicates that the team has the personnel to fill the position (the number of team members holding this position is greater than or equal to the requirement shown in table 1). The limiting positions are physician assistant, communications officer, and supervisory nurse.

Level 1 team roster

According to OER data, none of the 28 operational teams for which we have data meet the level 1 team roster requirement (table 3). Again, a circle in the table indicates that the team has sufficient personnel. Importantly, most teams have the required numbers of medical officers and paramedics. The most frequently missing positions are communications officer, administrative officer, physician assistant, respiratory technician, and logistics section chief.

Although the data show that many of the teams do not meet the personnel requirements as they are documented, the DMATs are indeed deploying both full and partial teams. We will discuss this issue further later in the report.

4. We use the new terminology throughout this report even though many of the documents used the old system of levels we discussed earlier.

Table 2. Operational DMAT staffing versus requirements for a 35-member deployable team[a]

	Required									Optional		
	Admin Officer	Comm Officer	Logis-tics Chief	Med-ical Officer	Para-medic	Phar-macist	Phy-sician Asst	Staff Nurse	Super-visory Nurse	Admin Asst	Equip Spe-cialist	Safety Officer
AK-1	●		●	●	●	●	●	●	●	●	●	●
AL-1	●	●	●	●	●	●		●	●	●	●	●
AR-1	●	●	●	●	●	●		●	●	●	●	●
CA-1	●	●	●	●	●	●	●	●	●	●	●	●
CA-2	●		●	●	●	●	●	●	●	●	●	●
CA-4	●	●	●	●	●	●	●	●	●	●	●	●
CA-6	●	●	●	●	●	●	●	●	●	●	●	●
CA-9	●	●	●	●	●	●		●	●	●	●	●
CO-2	●	●	●	●	●	●	●	●	●	●	●	●
FL-1	●	●	●	●	●	●	●	●	●	●	●	●
FL-2	●	●	●	●	●	●		●	●	●	●	●
FL-5	●	●	●	●	●	●	●	●	●	●	●	●
GA-3	●	●	●	●	●	●		●	●	●	●	●
HI-1	●		●	●	●	●	●	●		●	●	●
KY-1	●		●	●	●	●	●	●	●	●	●	●
MA-1	●	●	●	●	●	●		●	●	●	●	●
MA-2	●	●	●	●	●	●	●	●	●	●	●	●
MI-1	●	●	●	●	●	●	●	●	●	●	●	●
NC-1	●	●	●	●	●	●	●	●	●	●	●	●
NJ-1	●	●	●	●	●	●	●	●	●	●	●	●
NM-1	●	●	●	●	●	●	●	●	●	●	●	●
NY-2	●		●	●	●	●	●	●	●	●	●	●
OH-1	●	●	●	●	●	●	●	●	●	●	●	●
OK-1	●	●	●	●	●	●	●	●	●	●	●	●
OR-2	●	●	●	●	●	●	●	●	●	●	●	●
RI-1	●	●	●	●	●	●	●	●	●	●	●	●
TX-1	●	●	●	●	●	●		●	●	●	●	●
WA-1	●	●	●	●	●	●	●	●		●	●	●

a. We excluded PHS-1 from this analysis because most of their members are not listed in the OER membership database.

Table 3. Operational DMAT staffing versus requirements for a level 1 team roster[a]

	Required											Optional		
	Admn Officer	Com Officer	Lab Tech	Logistics Chief	Med Officer	Paramedic	Pharmacist	Pharmacy Asst	Physician Asst	Resp Tech	Staff Nurse	Supervisory Nurse	Equip Specialist	Safety Officer
AK-1				●		●	●	●				●		●
AL-1				●	●	●	●				●	●	●	
AR-1			●		●	●							●	
CA-1					●	●	●	●			●	●	●	●
CA-2					●	●	●	●			●	●	●	●
CA-4					●	●	●				●	●	●	
CA-6			●		●	●	●						●	
CA-9	●				●	●	●				●	●	●	
CO-2	●			●	●	●	●	●			●	●	●	
FL-1			●		●	●	●	●		●		●	●	●
FL-2			●			●	●	●				●		
FL-5					●	●		●		●		●	●	
GA-3					●	●	●					●	●	
HI-1					●	●		●	●				●	
KY-1					●			●	●		●		●	●
MA-1					●	●		●						
MA-2					●	●					●	●	●	
MI-1					●	●	●	●	●				●	
NC-1				●	●	●	●	●		●			●	
NJ-1			●		●	●		●			●			
NM-1	●				●	●	●				●		●	
NY-2					●	●	●	●			●	●		
OH-1	●		●		●	●					●	●	●	●
OK-1				●	●	●		●			●		●	
OR-2					●	●	●	●		●		●		
RI-1		●	●		●	●		●	●		●		●	
TX-1					●	●					●		●	●
WA-1			●		●	●	●	●		●			●	●

a. We excluded PHS-1 from this analysis because most of their members are not listed in the OER membership database.

Data limitations

The metrics we present here are only as good as the data used to construct them. There are a number of limitations when using the membership database for this type of analysis:

- The database does not account for personnel cross-trained in more than one position.
- The database contains numerous inconsistencies and errors that limit its usefulness.
- The database reflects only who is listed on the team roster. We cannot address whether all listed members are active and would show up to deploy if called upon.

See the appendix for a complete discussion of our data sources.

Equipment readiness according to OER data

OER maintains a list of DMAT equipment cache items. This list is updated periodically to remove little-used items and add new items. Equipment items are given priority levels of 1 through 5, with 1 being the highest priority and 5 being the lowest. Priority level 1 items are assumed to be critical for fulfilling the mission. The current cache list is the 17th revision of this list.

Each year, DMATs are asked to perform inventories of their equipment caches and submit this information to OER. OER uses this information to determine which equipment to buy to resupply teams.

DMAT cache inventories

We compared the 2002 DMAT equipment inventories for operational teams with the cache list at the time those inventories were completed (table 4). This table shows the ratio of equipment items to that required overall, and for each priority level.

According to the data, only 2 teams have 90 percent or more of all cache items. Most teams are in the range of 50 to 75 percent of all cache items. Two teams have less than 50 percent.

At this time, we cannot tell whether this table shows that there are truly cache deficiencies or that there are data errors at OER. As we will show later, team commander assessments of cache availability are often at odds with OER inventory records.[5]

5. One reason for this is that DMATs were directed to report only federally owned equipment. Equipment purchased by other sources is not included in this table.

Table 4. Ratio of equipment on hand to units required, grouped by priority level, for operational DMATs[a]

Team	1	2	3	4	5	Total
AK-1	0.80	0.98	0.75	0.84	0.26	0.81
AL-1	0.82	0.39	1.00	0.28	0.03	0.36
AR-1	0.94	1.04	0.50	0.60	0.28	0.85
CA-1	0.75	0.69	0.25	0.41	0.04	0.55
CA-2	0.69	0.68	1.00	0.65	0.35	0.61
CA-4	0.72	0.68	1.00	0.65	0.35	0.61
CA-6	0.73	0.75	1.00	0.51	0.16	0.62
CA-9	0.63	0.85	0.75	0.18	0.02	0.62
CO-2	0.87	0.89	1.00	0.21	0.10	0.69
FL-1	0.76	0.92	1.00	0.41	0.00	0.69
FL-2	0.80	0.85	0.50	0.78	0.65	0.80
FL-5	0.76	0.78	0.75	0.38	0.00	0.60
GA-3	0.76	0.69	0.75	0.79	0.03	0.57
HI-1	0.80	1.27	0.50	0.49	0.50	1.02
KY-1	0.84	0.93	1.00	0.24	0.00	0.69
MA-1	0.72	0.84	0.50	0.46	0.46	0.73
MA-2	0.82	0.68	0.25	0.38	0.23	0.59
MI-1	0.71	0.83	0.25	0.31	0.48	0.72
NC-1	0.77	0.83	0.25	0.41	0.03	0.64
NJ-1	0.63	0.75	1.00	0.28	0.23	0.60
NM-1	0.71	0.83	0.50	0.86	0.14	0.68
NY-2	0.75	0.97	1.25	0.89	0.32	0.81
OH-1	0.88	1.22	0.50	0.73	0.24	0.96
OK-1	0.82	0.60	0.25	0.31	0.00	0.49
OR-2[b]	0.66	0.98	1.00	0.36	0.19	0.75
PHS-1	0.14	0.87	0.00	0.23	0.09	0.60
RI-1	0.82	0.81	1.00	0.73	0.00	0.64
TX-1	0.83	0.96	0.50	0.84	0.08	0.76
WA-1	0.84	0.94	0.50	0.70	0.61	0.85

a. Based on revision 11 of the cache list.
b. This inventory was based on revision 15 of the cache list. We reconciled the inventory with the revision 11 cache list for presentation in this table.

Data limitations

Although cache items are prioritized, we still do not know which cache items are most often used (this information is not formally

Table 4. Ratio of equipment on hand to units required, grouped by priority level, for operational DMATs[a]

Team	1	2	3	4	5	Total
AK-1	0.80	0.98	0.75	0.84	0.26	0.81
AL-1	0.82	0.39	1.00	0.28	0.03	0.36
AR-1	0.94	1.04	0.50	0.60	0.28	0.85
CA-1	0.75	0.69	0.25	0.41	0.04	0.55
CA-2	0.69	0.68	1.00	0.65	0.35	0.61
CA-4	0.72	0.68	1.00	0.65	0.35	0.61
CA-6	0.73	0.75	1.00	0.51	0.16	0.62
CA-9	0.63	0.85	0.75	0.18	0.02	0.62
CO-2	0.87	0.89	1.00	0.21	0.10	0.69
FL-1	0.76	0.92	1.00	0.41	0.00	0.69
FL-2	0.80	0.85	0.50	0.78	0.65	0.80
FL-5	0.76	0.78	0.75	0.38	0.00	0.60
GA-3	0.76	0.69	0.75	0.79	0.03	0.57
HI-1	0.80	1.27	0.50	0.49	0.50	1.02
KY-1	0.84	0.93	1.00	0.24	0.00	0.69
MA-1	0.72	0.84	0.50	0.46	0.46	0.73
MA-2	0.82	0.68	0.25	0.38	0.23	0.59
MI-1	0.71	0.83	0.25	0.31	0.48	0.72
NC-1	0.77	0.83	0.25	0.41	0.03	0.64
NJ-1	0.63	0.75	1.00	0.28	0.23	0.60
NM-1	0.71	0.83	0.50	0.86	0.14	0.68
NY-2	0.75	0.97	1.25	0.89	0.32	0.81
OH-1	0.88	1.22	0.50	0.73	0.24	0.96
OK-1	0.82	0.60	0.25	0.31	0.00	0.49
OR-2[b]	0.66	0.98	1.00	0.36	0.19	0.75
PHS-1	0.14	0.87	0.00	0.23	0.09	0.60
RI-1	0.82	0.81	1.00	0.73	0.00	0.64
TX-1	0.83	0.96	0.50	0.84	0.08	0.76
WA-1	0.84	0.94	0.50	0.70	0.61	0.85

a. Based on revision 11 of the cache list.
b. This inventory was based on revision 15 of the cache list. We reconciled the inventory with the revision 11 cache list for presentation in this table.

Data limitations

Although cache items are prioritized, we still do not know which cache items are most often used (this information is not formally

Some teams have their own training courses and others require team members to take the online training course. Most teams have training activities at their monthly meetings and conduct field training of some sort.

Teams are required to send a request to OER for insurance coverage for certain types of training events. OER has records of these requests and also tracks the use of the online training course (to date such use has been minimal [6]).

Transport

When called to deploy, teams need to get their personnel and equipment to the point of departure. Some teams store their equipment on pallets ready to go. Others do not, sometimes because they don't have the space to do so or because they want to keep their options for palletization open.

Because the point of departure is often a military installation, most teams have memoranda of understanding (MOUs) with their nearby military facility that may include access to the base and transport to it. Other teams might own their own trucks or vans, or have rental agreements.

There are no documented standards for transportation requirements, and this information is not tracked by OER.

Data-gathering from teams tells us they are ready

As described briefly earlier, we gathered data through visits and discussions with NDMS response teams. Specifically, we spoke with:

- All current operational DMATs
  - Twenty-three visits to team locations
  - Three meetings with team commanders who were visiting the DC area
  - Three meetings by telephone
- Four developmental DMATs.

The results from our data gathering process are compiled into a short readiness assessment for all operational DMATs (table 5). This table indicates whether a team:

- Reports having a full capability for that resource. In these cases, the answer to the readiness question at the top of each column is "yes," which is indicated by a solid circle.
- Has nearly a full capability for that resource. In this case, the answer to the readiness question is a qualified "yes." For example, a team could deploy 35 members, but the group might not entirely represent OER's guidelines for expertise mix. These responses are indicated by an open circle.
- Does not have that capability. These responses are indicated by a blank.

At this time, PHS-1 is not included in our assessment. This team is sponsored by OER and is composed largely of active PHS officers, many of whom are also active with CCRF. The availability of their personnel is determined by different factors than the teams composed entirely of DMAT volunteers. PHS-1 team members are located throughout the U.S. and may deploy from separate departure points.

The overall picture provided by this qualitative readiness assessment is different from what OER data indicate, and it illustrates that teams are ready to fulfill a variety of missions. Though perhaps not all of their capabilities have been fully tested, most DMATs report that they are "ready to go."

Personnel and equipment

Most teams, 16 out of 28, report that they are fully ready with personnel and equipment to fulfill a mission. Eight teams reported nearly full capability for personnel, meaning that they could gather everyone except for a few key positions. In addition, one team reported that, while it has more than enough personnel on its roster, current economic conditions in the area would prohibit most team members from spending time on a deployment.

Table 5: Operational DMAT readiness based on team interviews

	OER requirements		Other key resources						
	Personnel	Equip	Training			Communications		Transport	
	Deploy 35 members?	Have full equipment cache?	Conduct individual training?	Conduct unit training?	Conduct joint training?	Have automated call-up?	Have dedicated hot-line?	Have vehicles available?	Have MOU for POD?
AK-1	●	●	●	●		●	●	○	○
AL-1	○	○	●	●				●	○
AR-1	○	○	●	●		●	●	●	○
CA-1	○	○	●	●	●		○	●	●
CA-2	●		●	●	●	●	●	○	○
CA-4	●	●	●	●	●	○	●	○	●
CA-6	●	●	●	●	●	●	●	○	○
CA-9	○	●	●	●	●	●	●	●	●
CO-2	○	●	●	○				●	○
FL-1	●	○	●	●	●	●	●	●	●
FL-2	●	●	●	●	●	●	●	○	●
FL-5	○	●	●	●		●	●	○	
GA-3	●	○	●	●		○	●	○	○
HI-1		●	●	●		●	●	○	●
KY-1	○	●	●	●	●		●	○	●
MA-1	●	●	●	●	●	●	●	●	●
MA-2	●	●	●	●	●	●	●	○	●
MI-1	●	●	●	●	●	○	●	●	●
NC-1	●	●	●	●		●	●	●	●
NJ-1	○	●	●	●	●	●	●	○	●
NM-1	●	●	●	●	●	●	●	○	●
NY-2	●	●	●	●	●	●	●	○	○
OH-1	●	●	●	●	●	●	●	○	○
OK-1	●	●	●	●	●	●	●	○	○
OR-2	●	●	●	●		●	●	○	●
RI-1	●	●	●	●	●	●	●	○	●
TX-1	●	●	●	●	●	●	●	○	○
WA-1	●	●	●	●		●	●	○	○

The large majority of teams, 23 out of 28, report having at least 90 percent of the equipment cache. Their response includes both team-owned and OER-owned items that the DMAT uses. This contrasts with

the OER equipment data results, in which only those items purchased by OER are included. Four teams self-reported having only 75 to 90 percent of the equipment cache items. This response was designated as a "qualified yes" because these teams told us that they had sufficient equipment to do most tasks on a mission, though they might need to improvise at times.

One team reported having less than 50 percent of its cache. This team, CA-2, deployed with its cache to respond to the Northridge earthquake in 1994. Many of the supplies were used or destroyed, but have not yet been resupplied by OER. Interestingly, this team deploys more personnel than almost all others (though they never take their equipment). This is a prime example of a team that is very ready for most missions, but not ready to meet the traditional advertised capabilities of a DMAT.

Discrepancies between OER data and information gathered from the teams can be mostly attributed to the following reasons:

- OER tracks only equipment for which they are accountable, not that which is actually needed for a mission. Many teams have team-owned supplies that are not included in the inventory.
- Teams with less than 90 percent of equipment mostly report that they were never resupplied with equipment following a deployment. This lack of resupply has existed for up to 8 years.
- OER judges resupply needs based only on the data from its inventory, not on what the team actually needs. For example, one team had a number of tents that were donated and therefore not included on OER's inventory. However, the team was then supplied with more tents because OER's own inventory indicated they were lacking this equipment. Meanwhile, the team had other true equipment needs that went unfilled.

Other key resources of training, communications, and transport

As stated earlier, OER does not have guidelines or metrics to assess the key resource needs of training, communications, and transport. We suggest some guidelines in this assessment, based on the needs

that are implied in other OER guidelines as well as on teams' best practices and what they tell us is needed to be "ready."

Training: All teams conduct individual training in various forms, such as encouraging participation in the online modules and offering training during their regular team meetings. We observed training during meetings ranging from operation of new communications equipment to a presentation on crush medicine. A few DMATs have established all-day orientation programs for new team members.

All teams conduct unit training, with the caveat that one newly formed DMAT has not yet completed a full functional exercise.

Most teams conduct joint training, meaning that they periodically exercise and train with other DMATs. This training is important because it prepares DMATs to work together and be interoperable at the event scene. California teams meet annually for an exercise called Rough and Ready. Other teams initiate such exercises on their own. Teams that are isolated geographically are less likely to have this capability.

Eighteen teams have experience training with other DMATs. While others may train at times with local National Guard units or other responders in their state, we did not include these activities here.

Communications: This is an implied requirement, in that if a DMAT has guidelines to be ready to deploy within 8 hours, then all of the active team members must be contacted in a shorter time frame. Through interviews, we found that best practices included automated call-up systems and dedicated hotlines to share information and receive responses about individual availability.

Twenty teams indicated they have an automated call-up system, linking to members' pagers or telephones. These systems are not provided by OER and are paid for out of the DMAT's budget or through donations. Four other DMATs have some broadcast capability through fax, e-mail, or other alerting system. The remaining teams use personal e-mail and phone trees to call up team members. We regard this as a limited capability because e-mail access may be restricted to business hours.

Twenty-four teams have a dedicated hotline they can use for posting status updates and receiving messages about deployment availability. One other has pre-identified a member's home phone as the number to call. Others may need to make inquiries and receive replies on the same phone line, potentially requiring more time because these functions are not done in parallel.

Transport. This is also an implied requirement, in that a DMAT will need to get all personnel and equipment to the point of departure within the requisite 8 hours. OER does support the DMATs in arranging MOUs with trucking companies, and when a team is placed on Alert status OER will pay for a team to rent a vehicle and load it. Teams frequently deploy to the scene by automobile, so having quick access to a vehicle greatly enhances their readiness.

All operational DMATs have MOUs with other transportation providers, most often a moving company and sometimes a National Guard unit. However, we considered this a partial capability because these agreements may be subject to other demands, such as peak moving times and National Guard training. Nine DMATs also have their own vehicles or trailers that can be pre-loaded and ready to go. Not all of these vehicles can be driven; a team might have just a trailer that can be hitched to a variety of separate vehicles.

Fifteen DMATs have a written MOU with a local military resource to be their point of departure. This is necessary to ensure quick access to the facility when the team needs to deploy. However, many of the MOUs have not been tested in the current times of increased security. Eleven teams have an informal agreement or working relationship with a local military resource, but it is not in writing. Two teams report they are still developing this capability.

System-wide capabilities

Team-by-team readiness assessment is only part of the total capabilities picture. OER has shown no hesitancy to deploy partial teams or form a deployment unit out of parts from more than one team.

We can build another readiness indicator by counting the numbers of teams that can formed out of the entire membership list. For

example, how many 35-member teams could OER compose using all personnel in the system? This question is consistent with how DMAT personnel have been used. As we discussed earlier, teams may deploy a few personnel to backfill another team in key positions.

Personnel

Table 6 shows the total number of people in the membership database for each required position. The next column shows the number of deployable teams worth of each position in the system. For example, 2 communications officers are required for deployment. Thus, there are 131 divided by 2 teams' worth of communications officers in the system. According to the data, OER could form 56 35-member teams with all required positions. The limiting factor is physician assistants.

Table 6. System-wide personnel analysis

Position	Total members	Deployable 35-member teams	Staffed level 1 teams
Required			
Administrative Officer	128	128	21
Communications Officer	131	65	21
Laboratory Technician	76	[a]	9
Logistics Section Chief	83	83	27
Medical Officer	761	253	84
Paramedic	1,972	493	219
Pharmacist	127	127	42
Pharmacy Assistant	33	a	5
Physician Assistant	226	56	18
Respiratory Technician	113	a	9
Staff Nurse	1,308	218	62
Supervisor Nurse Specialist	292	146	48
Optional			
Administrative Assistant	245	245	a
Equipment Specialist	316	316	105
Safety Officer	93	93	31

a. Not required

The last column shows how many operational DMAT rosters' worth of each position are in the system. According to this analysis, OER could form only 5 team rosters that meet the requirements. The most limiting positions are pharmacy assistant, respiratory technician, and laboratory technician.

Interestingly, there is no explicit deployment requirement for these positions. These slots are required as part of the reservoir of extra capability that OER may require as circumstances allow.

Equipment

We used the operational DMAT equipment inventories described earlier to determine how many complete equipment caches could be formed system-wide. As shown in table 7, the answer to this question is none. The limiting factor is priority 5 equipment (the lowest priority). There are only 2 complete caches' worth of priority 1 and 2 equipment.

Table 7. System-wide equipment analysis[a]

Priority	Number of caches
1	7
2	2
3	16
4	1
5	0

a. Based on operational DMAT equipment inventories.

This analysis gives some additional insight into system-wide inventory levels. However, it suffers from the same limitations we discussed previously. Furthermore, OER does not assemble caches piecemeal from different teams. It's also important to note that some developmental DMATs have equipment, and OER stores a cache in Rockville that can be deployed to a site if a team's cache is not sufficient or is difficult to transport to the site.

Do the DMATs carry out their advertised mission?

As was briefly mentioned earlier, the majority of operational DMATs do not actually deploy to arrive first at the scene with a full 35-member configuration and equipment. In this section, we discuss the changes in NDMS missions over time, and how these changes are reflected in the DMAT deployment histories. We then examine why some DMATs are utilized differently than others and the impact of adding new teams.

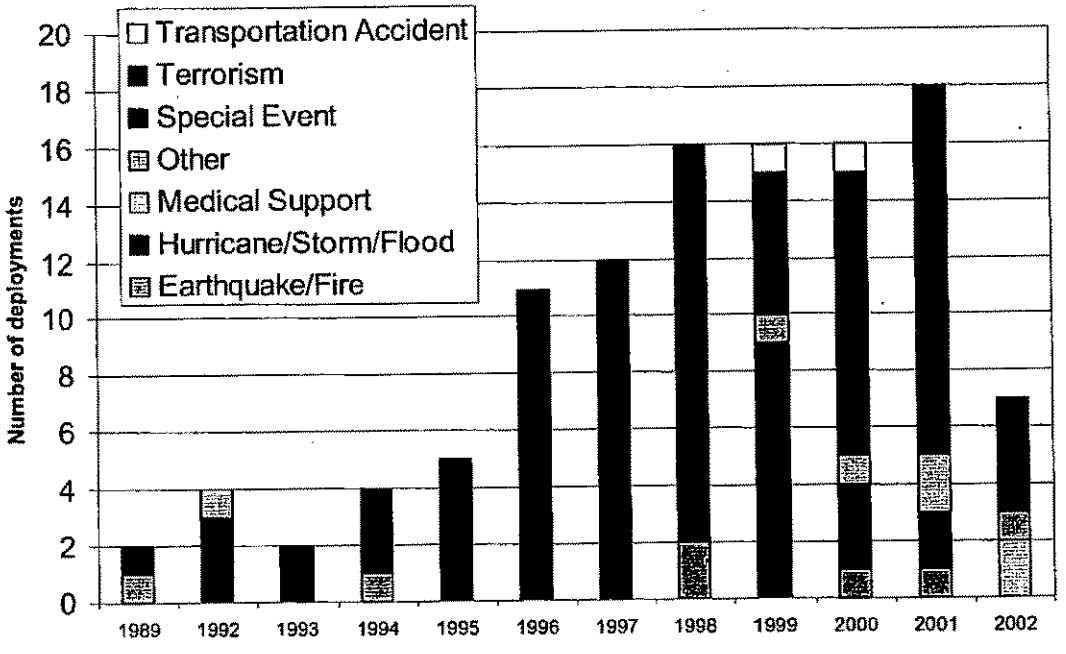
DMATs are now being used primarily for missions other than for what they were originally designed. However, OER doctrine has not kept up with these changes and thus does not reflect the current state of team or system readiness.

NDMS missions have changed over time

For the first 7 years of the NDMS, DMAT missions focused on natural disasters, such as hurricanes, floods, earthquakes, and fires (figure 8). One mission for medical support (1992) also transpired. A turning point occurred in 1995 with the first deployment after a terrorist event, the bombing of the Murrah Federal Building in Oklahoma City. Following that, each of the last 7 years have included deployments in support of special events. Most of these involve pre-staging for high-profile events, such as the Olympics, State of the Union addresses, and presidential inaugurations. While the last few years have had relatively few hurricanes or earthquakes, DMATs continue to support these missions as well.

The mission of pre-staging for special events has dominated in recent years. The perceived threat in these cases is not the traditional hurricane or storm, but terrorism. This has unique implications for readiness. This "new" threat creates requirements for expertise mix, equipment, and training that may be very different from those the system has been designed to provide.

Figure 8. History of NDMS missions involving DMATs[a]



a. Source: OER briefings (see the appendix for a discussion of all data sources).

DMAT deployments have changed

Corresponding to the changes in NDMS missions, changes in DMAT deployments are also evident. For developing a scenario assessment of readiness, it is important to note which personnel expertise and tasks are most needed to fulfill the "new" missions. First, we discuss our analysis of actual DMAT personnel categories that were deployed as compared to the requirements for team staffing. Then we look at whether DMATs are being used as "teams" and some of the variables encountered in selecting which DMATs should deploy.

Personnel required vs. personnel actually deployed

Certain personnel job classes are used more frequently on deployment than others (table 8). It seems intuitive that a medical assistance team most likely has roles for clinicians and, indeed, the most frequently deployed job classes are paramedics, nurses, and physicians (in that order).

Table 8. DMAT personnel in system vs. number deployed

	In System[a]	Deployed[b]	Ratio[c]
Administrative Assistant	245	22	0.09
Administrative Officer	128	89	0.70
Communications Officer	131	101	0.77
Equipment Specialist	316	68	0.22
Laboratory Technician	76	9	0.12
Logistics Section Chief	83	77	0.93
Medical Officer	761	248	0.33
No Requirement	522	215	0.41
Paramedic	1,972	493	0.25
Pharmacist	127	39	0.31
Pharmacy Assistant	33	8	0.24
Physician Assistant	226	98	0.43
Respiratory Technician	113	10	0.09
Safety Officer	93	30	0.32
Staff Nurse	1,308	356	0.27
Supervisor Nurse Specialist	292	189	0.65
Team Leader	89	158	1.78
Total	6,515	2,210	0.34

a. Number of individuals in the system that hold the DMAT position.
b. Number of persons deployed with that position (counts a person once for each deployment they make) since May 1999.
c. Number deployed divided by the number in system.

On the other hand, the NDMS Team Handbook [3] indicates team staffing requirements for other clinical roles, such as respiratory technicians, pharmacy assistants, and laboratory technicians. Over the past 3 years, only ten or fewer of each of these positions has actually been deployed. For laboratory technicians and respiratory technicians, the number deployed is only about 10 percent of the total number of these personnel in the system. Thus, while teams are required to recruit personnel with this expertise, they have a low likelihood of actually being deployed.

The job classes with the highest ratio of deployments to personnel in the system are the support categories of logistics, communications, and administration (0.93, 0.77 and 0.70 percent, respectively). Interestingly, there is a high demand for team leaders. This may reflect the role of team leaders to serve individually on the MST in addition to

missions when their own DMAT is deployed. It also probably reflects the fact that there will be only one commander and deputy commander listed for each team in the membership database.

We also analyzed which job classes were used more frequently in the "standard" 35-member deployable team configuration. To do so, we compared the number required for each position on a 35-member detachment (table 9) with those actually deployed for six teams that sent 35 or more personnel to the Word Trade Center (WTC) response following the events of September 11, 2001. Again, and in the same order, the three job classes used most were paramedics, nurses, and physicians, each with more personnel on deployment than required by staffing guidelines. Other clinical roles that had more deployed personnel than those required were supervisory nurse specialists and pharmacists.

Table 9. DMAT team composition—WTC case study

	Required[a]	Average/ Deployment[b]
Administrative Assistant	1	0.17
Administrative Officer	1	0.67
Communications Officer	2	1.33
Equipment Specialist	1	1.33
Laboratory Technician	0	0.50
Logistics Section Chief	1	1.17
Medical Officer	3	4.33
No Requirement	0	1.67
Paramedic	4	12.50
Pharmacist	1	1.33
Pharmacy Assistant	0	0.33
Physician Assistant	4	2.50
Respiratory Technician	0	0.50
Safety Officer	1	0.33
Staff Nurse	6	6.83
Supervisor Nurse Specialist	2	3.50
Team Leader	-	1.33
Total	27	40.33

a. For a field deployable unit.
b. For the six teams that deployed 35 members or more to the WTC.

The demand for clinical expertise on DMATs is apparent. For the most part, staffing guidelines reflect this by requiring higher numbers of the key positions of paramedics, nurses, and physicians (4, 6, and 3, respectively). However, in the WTC response, the number of deployed paramedics outpaced the requirement by more than 3 to 1. To enable better readiness assessment in the future, staffing guidelines should be adjusted to reflect the need to fulfill a wider variety of evolving NDMS missions. We will return to this issue later.

Not all teams are used the same way

While the DMATs are advertised as each being able to deploy a 35-member team with its own equipment, in actuality very few teams deploy in this way. As noted earlier, since January 1997, only 15 DMATs have completed a deployment with 30 or more total personnel, whereas all operational teams have completed deployments with smaller groups. Certain DMATS deploy as "full" teams, and are more likely to be used in this way repeatedly. Similarly, other DMATs rarely deploy with both personnel and equipment, and instead are more frequently used as "second-wave" teams that use the first team's equipment after that team leaves the scene. While the methods and assumptions for activating DMATs may be that all operational teams have an equal likelihood of being deployed, this is in fact not the case.

DMAT rotation schedule is not followed

OER has designed a rotation schedule for the DMATs to periodically be on "advisory." According to this monthly schedule, 3 or 4 DMATs from the eastern United States and 3 or 4 DMATs from the western part of the country are identified as the first teams to be activated in the event of a mission. During an advisory month, the identified teams need to be "leaning forward," by having their equipment in place and their personnel aware of the possibility of being deployed. The teams reported to us that during an advisory month they advise personnel of the need for frequent communication, keep track of which personnel are unavailable (e.g., due to travel), confirm their MOUs for team transport, and verify their available equipment.

Presumably, the intent of this rotation schedule is to direct some teams to be more "ready" during that month, so that they could more quickly deploy if needed. By having the teams on a rotation, they are aware of this need to be ready ahead of time, and their advisory months are spread throughout the year.

However, OER does not always follow this schedule when deciding which teams to deploy (table 10). For each of the past 5 years, notably more DMAT and NMRT personnel were deployed from teams that were not on advisory that month (table columns listing "deployed off") than from teams that were on advisory (table columns listing "deployed on"). Some teams, such as FL-2, OH-1 and NY-2, have deployed only in months that they were *not* on advisory, which means that:

- During the months they were on advisory, other teams went instead
- They did not have the advantage of "leaning forward" during the months that they were deployed.

No operational DMAT has deployed only during months that they were on advisory.

This comparison begs the question of what it truly means for a team to be on advisory. As seen in practice, OER does not follow the rotation schedule as an indication of which teams to activate. While leaning forward enhances team readiness, teams that were deployed "off rotation" must have also been assumed to be ready to deploy.

As one team pointed out to us, perhaps the rotation schedule should indicate "down" time for a team, rather than "up" time. In that sense, teams would assume they need to be ready-to-go during most months of the year. During the "down" months, teams could focus on inventory management and offsite training, thus preparing themselves to be more ready during the "up" months.[6] This recommendation will be addressed again later.

6. The "down" months would roughly correlate with a level 5 rating in GSORTS, which designates the unit is in "overhaul."

Table 10. Number of team members deployed while on and off advisory according to the rotation schedule (for operational DMATs)[a]

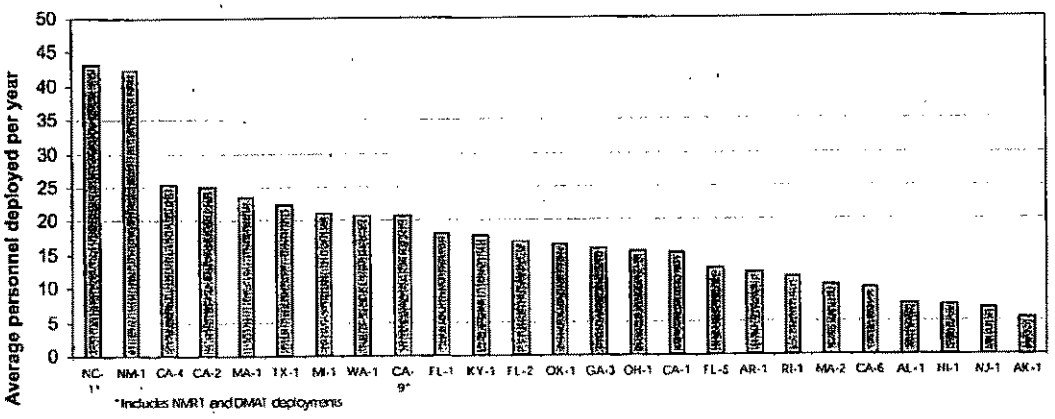
	1998		1999		2000		2001		2002	
	On	Off	On	Off	On	Off	On	Off	On	Off
AK-1	0	2	0	2	0	0	23	0	6	0
AL-1	0	8	3	0	0	0	4	15	0	11
AR-1	0	19	17	4	0	0	0	24	4	11
CA-1	0	0	0	19	15	20	0	8	0	8
CA-2	0	10	10	18	0	39	40	1	9	0
CA-4	0	25	43	4	0	32	0	29	4	7
CA-6	0	0	0	18	0	1	20	0	11	0
CA-9[a]	0	12	1	23	21	8	0	15	0	19
CO-2[a]	0	28	0	32	0	36	0	48	0	50
FL-1	0	0	8	25	0	0	27	0	3	7
FL-2	0	15	0	45	0	1	0	40	0	9
FL-5	22	0	21	6	0	0	0	3	0	5
GA-3	1	22	15	14	0	0	0	42	0	8
HI-1	0	0	0	1	0	0	0	6	0	7
IN-2[b]	0	0	0	0	0	0	0	1		
KY-1	29	31	0	23	1	0	0	7	0	5
MA-1	43	32	1	40	0	18	0	37	8	0
MA-2	0	31	0	13	0	0	7	3	0	6
MI-1	0	47	33	12	0	1	0	43	0	7
NC-1[a]	46	12	32	40	0	0	3	10	41	17
NJ-1	0	16	0	18	0	2	4	8	0	9
NM-1	0	35	50	0	0	40	1	50	0	6
NY-2	0	4	0	29	0	12	0	54	0	17
OH-1	0	0	0	57	0	35	0	20	0	9
OK-1	0	7	27	1	0	0	0	19	0	8
OR-2	0	0	0	0	0	0	0	27	0	7
RI-1	20	0	0	44	20	0	2	19	0	25
TX-1	6	71	0	28	0	0	0	7	0	5
WA-1	0	0	0	30	24	0	0	12	0	7
Total	167	427	261	546	81	245	131	548	66	270

a.Includes DMAT and NMRT deployments.
b.Team no longer active.

Some teams deploy more than others

While teams deploy more often "off rotation" than "on rotation," it is also evident that some teams deploy more personnel than others. Figure 9 illustrates the average number of personnel deployed per team per year, for the years since 1992 that each team has had an active MOU with OER. As can be seen, the NC-1 and NM-1 teams both average more than 40 personnel deployed per year, while the next highest teams, CA-4 and CA-2, have an average of 25.[7]

Figure 9. Average number of team members deployed per year for operational DMATs



There are several reasons why some teams could deploy more often than others:

- They are more "ready" in terms of
  - — Personnel
  - — Equipment
  - — Expertise or training

7. The NC-1 team's deployment history includes both DMAT and NMRT personnel because the data we obtained from OER does not allow separation of these different deployments.

- They are in a geographic location that makes it easy to get to the event
- They are more "connected."

Both the NC-1 and NM-1 teams indicated to us that they are "ready" and likewise they are regarded by their peers as being strong teams. However, OER's data indicate that neither of these teams have the full set of personnel *and* equipment needed to fulfill a deployment of 35 team members arriving first at the scene (this is in stark contrast to what these teams tell us directly). If OER's own record keeping were being used as an indicator of which teams to activate, perhaps neither of these teams would be identified as being capable of fulfilling the mission. Given their frequent record of deployment, this is obviously not the case.

While the NC-1 and NM-1 teams don't have the geographic obstacles for transportation that teams from Hawaii and Alaska might, they are also not local to the most recent foci of events in Salt Lake City, the District of Columbia, or New York City. As well, neither team is near a large commercial airport hub. Instead, we believe it is most likely that these teams are more "connected" to those making the deployment decisions at OER. That may be because of training and expertise, or it may be because of leadership compatibility. However, the decision to send some teams more frequently than others is self-reinforcing and can create an imbalance of readiness among the system of DMATs.

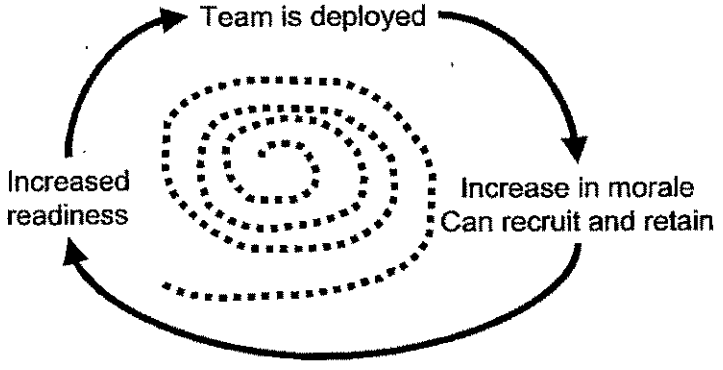
Utilization affects readiness

Being chosen to deploy is the reward for DMATs and their volunteer personnel. We quickly learned from team members that this motivation for service is their primary reason for being on a DMAT. To ensure all team members feel they have a useful role to perform, they need to feel that they are a part of the system and that they have an opportunity to use their skills. Accordingly, whether teams get to deploy is an important factor in maintaining team readiness.

Operational tempo affects team readiness

If a team is selected to deploy, their personnel receive the primary reward for being in NDMS—the opportunity to serve. Deployment also provides ongoing training, both individually in the skills needed to perform the tasks and as a team working together at the scene. As illustrated in figure 10, operational tempo is connected to team readiness in a cycle that can induce team growth and increased readiness as the team is able to deploy more.

Figure 10. The operational tempo spiral



A number of teams told us that optimum operational tempo involves a large group deployment about every 9 to 18 months. If teams deploy more often than this, it can be difficult to be resupplied with equipment and to make arrangements with their employers. If teams deploy less often than this, personnel lose interest and recruitment and retention become difficult. As one team commander stated, "It's difficult to keep 120 people motivated when only 2 or 3 deploy each year." As well, frustration grows if teams feel they are "passed over" in decisions of which DMATS to deploy.

Individual operational tempo is also an issue to be addressed. As noted above, each operational DMAT is required to have 12 respiratory technicians on the roster, though in the past 3 years only 10 respiratory technicians have ever been deployed. On the other hand,

team leaders deploy most frequently. Many teams told us that they encourage cross-training of their personnel to adjust for some of these disparities.

To enable and enhance team readiness, operational tempo must be considered. This need can be met by more evenly selecting teams for deployment, by creating team activities (such as with regional exercises), and by aligning DMAT staffing guidelines with the current mission requirements. These recommendations will be addressed later.

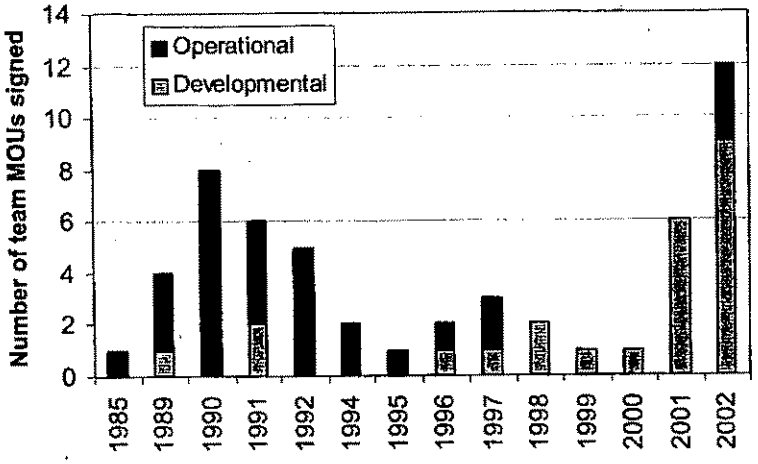
Increase in the number of teams could affect readiness

A current effort to increase the number of operational DMATs is evident when we examine the number of new teams signing MOUs with OER over the past 13 years (figure 11). During 2001 and 2002, a total of 18 new teams have signed MOUs; during the previous two years (1999 and 2000), only 2 new teams were created. Though we are unsure of the motivation behind this increase in the number of teams, it raises the following concerns:

- *Provision of equipment*—If no teams currently have a full equipment cache and resupply of equipment is problematic, having more teams only thins out the available funds for new equipment.
- *Operational tempo*—Unless the number of missions increases dramatically (and disasters by their nature are nearly impossible to predict), operational tempo for all current teams will decrease as more teams are created.
- *Management attention*—If it is difficult for OER to provide current ID cards and to track personnel and payment for current teams, the addition of new teams, without adding new support at OER, will only make these tasks more difficult.

Thus, while it might seem on the surface that the creation of more teams would enhance overall DMAT system readiness, it is more likely to have the opposite effect unless additional resources are added to the system.

Figure 11. Number of team MOUs signed



Other issues restrict DMAT readiness

Along with the readiness issues mentioned earlier, three others deserve separate mention. These issues mostly affect DMAT readiness by providing too much administrative burden or cost for an individual team to address effectively. Centralized guidelines and assistance, using both OER and other HHS resources and expertise, could greatly reduce the teams' administrative workload and provide a much more "ready" system overall.

Workers' compensation and liability insurance

When DMAT personnel are federalized for a mission, their individual liability and risk of personal injury is covered through federal sources. This is necessary to reduce the financial risk both to the individual and to the system should an individual decide to make a claim against NDMS or OER.

However, when teams are active but not federalized, such as for team training and warehouse work, this insurance coverage does not apply. Some teams, such as those in California, have additional coverage provided by their state. This is not the case for most teams. In essence, DMAT volunteers may be putting their personal employment at risk

should they get injured while completing DMAT duties. For example, if a person is injured while doing heavy lifting and moving of equipment in the warehouse, he or she may not be physically able to return to the job in the near future, and also can't pursue workers' compensation.

Many teams report that they have investigated the costs of providing insurance coverage for their members. In most cases, this is prohibitively expensive, possibly exceeding a team's entire annual budget. Teams are also faced with the administrative burden of learning about and obtaining insurance bids on their own.

Guidance from OER and/or other HHS resources could assist the teams in reaching this level of financial and personal security. Whether the DMATs could join as a large group for insurance coverage and other avenues that might be available should be explored as soon as possible. This issue should be addressed proactively, before a person becomes injured.

Becoming a 501(c)3 charitable organization

As each DMAT developed, it became a unique administrative entity, well connected to the sponsor or operating mostly as a stand-alone organization. Recently, OER has required all teams (for which it is legally possible) to become 501(c)3 charitable organizations. The rationale is that this organizational status will ease disbursement of funds and other resources to the teams. Some teams, which are tied to government entities such as a county, cannot become a 501(c)3 organization.

Teams are faced with the burden of figuring out how to do this, and some teams have in fact voted not to do so. There are also financial costs associated with filing the paperwork and hiring accounting and legal consultants. Other DMATs have completed the approval process, and are now faced with the additional task of completing annual tax returns. Many questions arise from the need for a local team to document its participation in a federal program, such as:

- If the team uses part of its budget from OER to pay someone to do administrative work part-time, is that person a team

employee? If so, is the DMAT then obligated to provide workers' compensation insurance for that employee?

- If team members are paid for DMAT-related work but not while federalized (such as administrative duties or training), are they federal employees?
- If equipment that the team uses was paid for with federal funds, does that equipment belong to OER and not to the team? If it belongs to OER, should the team claim it as an asset for tax purposes?
- How do they report assets that get consumed or destroyed while on a federal deployment? Does the team need to track depreciation of their OER-supplied equipment?
- Are the funds given to the DMAT from OER considered a grant? Should there be specific procedures for handling these funds as if they were a grant? How should those funds be claimed for tax purposes?

While the 501(c)3 status does potentially make it easier for the teams to receive donations, these financial benefits are likely outweighed by the legal and accounting fees, as well as personal time devoted by DMAT personnel to this issue.

Data issues

Several features of OER's existing information technology (IT) limit the ability of OER to effectively manage team readiness. OER is aware of many of these issues and has begun to implement some improvements.

Outdated IT work processes

OER does not have a modern IT infrastructure. For example, OER financial accounting is conducted in a series of spreadsheets, rather than a database. This leads to several problems:

- While in electronic format, data are not captured into a database system. Every information query requires significant hand-processing to answer.

- Historical financial information is not readily available to anyone outside of the financial staff.

Other functions suffer from this same problem. For example, equipment inventories are submitted in separate Excel spreadsheets and are not managed in a database. Similarly, OER requires that membership applications be submitted in paper copy only. OER also seems to lack modern document tracking systems. Thus, membership applications are often lost or misplaced. *Every team reports problems with lost or misplaced communication with OER.*

No secure electronic communication to teams

This issue restricts OER in at least two ways. First, the only mechanism to communicate or distribute sensitive information to the teams is via conference call. There are no secure web pages. Secure documents can only be distributed by fax.

Absent secure communications, there is no way to submit sensitive documents—such as membership applications—electronically. This aggravates the paperwork and document tracking problems at OER.

Database quality control

CNA attempted to crosswalk records of which members deployed with records from the membership database. Historical financial records could be matched with membership lists only with difficulty. Among other issues, this makes it more difficult to audit OER financial accounting.

Stovepiped data

Different groups within OER capture the same information into their own systems. For example, OER does not have a single, definitive listing of team deployments. The number and designation of recent deployments varies across staff divisions.

To examine the change in missions over time, we used a briefing that gave a list of all deployments. OER's payroll database matched less than two-thirds of the deployments listed in the briefing. Presumably, the payroll database should be the authoritative source because it would detail who was paid. OER's deployment database also matched

less than two-thirds of the deployments listed in the briefing, and did not agree with those listed in the payroll database.

National Medical Response Teams

NMRTs are specialized medical response teams developed to provide medical and decontamination services in a hazardous materials (HAZMAT) environment, and/or support to other federal agencies. There are three DMATs with specialized NMRT capabilities: NC-1, CO-2, and CA-9. In addition, there is a Washington, DC, NMRT that is not part of a DMAT. The DC NMRT is different in many ways from the other three teams. The majority of this section will focus on the three DMAT/NMRTs.

In general, the NMRTs are better funded, prepared, and have more communication with each other and with OER than do the DMATs. As such, the teams' challenges tend to be at a higher level than many of the basic hurdles facing the DMATs.

Advertised capabilities

The NMRTs were developed by HHS to "deploy and provide medical and decontamination (decon) services and/or assist federal agencies in HAZMAT environments" [1]. The Response Team Description Manual [1] states that teams must:

- Be able to deploy within 4-6 hours, for up to 3 days, and have enough food and water to supply the team for 24 hours
- Have an equipment cache sufficient to support the decon and medical operations for the first 12 hours, with the exception of water necessary for decon
- Have 36 personnel in 25 positions, and mobilize with two 15-passenger vans and 2 crew cab trucks
- Provide decon and triage services and some medical treatment to decontaminated patients

- Decontaminate approximately 120 ambulatory and 20 non-ambulatory people per hour (where possible, decontaminated patients are handed off to the on-scene DMAT or are transported to area hospitals).

Can the NMRTs meet their advertised capabilities?

As with the DMATs, much of the documented OER requirements focus on the key resources of personnel and equipment. The only resource for which data are available is equipment.

Equipment

Equipment inventories obtained from OER show that all three deployable NMRTs have more than 90 percent of the required equipment items (table 11).

Table 11. NMRT equipment caches

NMRT	Equipment ratio[a]
Central (CO)	0.94
West (CA)	0.96
East (NC)	1.233

a. Ratio of items on hand to items required.

Other key resources

Effective communications systems are essential for quickly recalling staff members. Furthermore, this call-down system must be practiced and the teams must be well trained in their missions. To deploy quickly, equipment must be packed and easily loaded. The teams also need guaranteed and planned access to aircraft to carry the team and equipment as necessary.

Data collected during team visits

Table 12 shows qualitative readiness indicators for the three NMRTs that are part of DMATs. We gathered this information in visits with all

three DMATs. We will discuss the DC NMRT separately because it is a special case. The table is divided into two categories of indicators: OER requirements and other key resources. Scoring is the same for this assessment as the previous assessment for DMATs. A solid circle indicates a "yes" (the team meets the requirement) and an open circle indicates a qualified "yes" (the team partially meets the requirement).

Table 12. NMRT readiness indicators

	NC-1	CO-2	CA-9
OER requirements			
Complete cache	●	●	●
Meet personnel requirements	●	●	○
Maintain skills through training	●	●	●
Deploy in < 6 hours	●	●	○
Other key resources			
Call-down procedure in place	●	●	●
Call-down practiced	●		●
Equipment packed and aircraft-ready	○	●	○
Guaranteed aircraft availability			
Guaranteed security at site			

OER requirements

All three NMRTs believe that they meet all of OER's doctrine for readiness: The West NMRT shares some leadership personnel with the CA-9 DMAT, but could also backfill the NMRT with members from CA-2 who are specially trained in Chemical, Biological, or Radiological (CBR) response. Time needed to deploy for the West NMRT is potentially hampered by traffic in the Los Angeles area.

NMRTs are advertised as being prepared to provide mass or standard decon following CBR incidents. OER doctrine states that teams can provide decon to 120 ambulatory and 20 non-ambulatory people per hour. Based on information gathered from the teams, they meet or exceed this expectation in their training exercises. At least one team has 4 shower units that can each provide decon for up to

350 ambulatory people per hour, for a total of up to 1,400 persons per hour. This assumes that a Metropolitan Medical Response System (MMRS) team is also providing decon for non-ambulatory patients. The team has never actually practiced with this many patients for a significant length of time. Based on our conversations with the teams, it is unlikely the team could sustain decon at this pace.

Other key requirements

Non-doctrine indicators suggest a varied picture of readiness. All NMRT members on all three teams have pagers. NC-1 and CA-9 practice their call-ups regularly. CO-2 has not practiced but is confident their NMRT members would stand up if the call went out. All three teams have their equipment packed and ready to roll—be it on the road or via aircraft.

Washington, DC, NMRT—a special case

The Washington, DC, NMRT grew out of the Arlington County Fire Department's development of the Metropolitan Medical Support Team (MMST), which became the Metropolitan Medical Response System. During the development of the MMST, the team worked with the federal government to develop capabilities to respond to chemical weapons attacks. As their capabilities grew, OER designated the team an NMRT.

Capabilities

Unlike the other teams, the DC NMRT was not designed to travel. Rather, its mission is to respond to chemical and radiological incidents in the Washington, DC, metropolitan area. The team has minimal training with biological weapons response. In addition, the team did not develop in such a way that it is self-sustaining. As the team developed, members assumed they'd be working in or near the area where they live and that team members would go home following their shift. The team is currently working to acquire equipment to be self-sustaining, in an austere environment, for a number of days.

The DC NMRT meets training, personnel, and equipment readiness requirements other than the capability to be self-sustaining for 24 hours. Since its development, the team has had challenges

locating affordable space to store its equipment. Therefore, it is currently stored in multiple facilities around the DC metropolitan area. The team is in the process of building a facility that should meet its needs for the next 5 years.

Administrative support

The other unique aspect of the DC NMRT is that it is built into the emergency response capabilities in the DC metropolitan area. The team is funded through the regional Council of Governments (COG) and managed by the Arlington County, VA, Fire Department. The management agreement allows team members to work in any of the COG regions. They are also paid and insured by their home region during deployment and, therefore, are not federalized. This situation also means that OER does not maintain data on the team's deployment history.

Would the DMATs really do their mission?

Although the teams' capabilities are important, the practical utility of current missions is limited to specific situations. In all CBR events, the type of response and the required timing of that response depends on the agent and dose/concentration released. Some generalizations are possible within each category of event.

Radiological incidents

In responding to radiological incidents, guidelines [7] indicate that decon in a radiological incident is secondary to dealing with life-threatening injuries. Therefore, medical management to stabilize patients should occur before patients are decontaminated. In this situation, the combination of decon and medical capabilities of the NMRTs would be particularly valuable, even if they arrive on scene several hours or a day after the incident.

Chemical incidents

The utility of the NMRTs in chemical incidents depends in large part on the timing of their response. Although the maximum time between exposure and successful decon and/or treatment depends

on the agent, 8-12 hours is typically too long to wait for decon and specialized medical treatment. For example, treatment for exposure to high concentration cyanides must be near immediate to avoid fatalities. Exposure to nerve agents, such as sarin gas, can be lethal within minutes. Treatments for both cyanide and nerve agents are currently part of the NMRT cache, yet, realistically, the teams must be on site and have immediate access to victims for their services to be valuable.

Biological incidents

The value of the NMRT with regard to most biologic agents is unclear. This is in part because officials are unlikely to recognize biological outbreaks until days or weeks after agent dissemination. As such, mass decon is unnecessary, and any treatment options, including prophylaxis and vaccination, can generally be provided by the traditional DMAT teams.

How does pre-staging affect NMRT capabilities?

The NMRTs can better achieve their mission if the teams are pre-staged. Pre-staging allows for instantaneous responses, including decon and medical treatment. In the case of hydrogen cyanide, for example, victims who inhaled lower but still potentially fatal concentrations can be treated after an hour or more of symptom onset. In such cases, hundreds of victims might benefit from an NMRT on-scene. Waiting more than 4 hours for the teams to arrive is likely to be too late to save lives.

Possible NMRT roles if not pre-staged

In situations in which NMRTs are not pre-staged, they can and do play important roles as specialized teams. As mentioned above, they are valuable national assets in responding to radiological incidents, accidents or otherwise. In any CBR incident, NMRTs can function as specialized DMATs, providing consultation services to hospital workers. In some situations, NMRTs can provide decon and medical treatment to local emergency responders who received lower levels of secondary contamination during their response.

In non-CBR incidents, the NMRTs can provide basic HAZMAT services anywhere in the country. Based on our conversations with the NMRTs, many areas of the country have not invested in HAZMAT response, in large part because of the cost. In some of the regions where HAZMAT is available, the NMRTs can support the effort by focusing solely on medical care. HAZMAT response is more broad, and many local response teams don't have enough medical experts to decon and treat victims.

Issues affecting NMRT readiness

The data suggest that NMRTs are ready to mobilize—that is, get out of their own facilities. The following readiness indicators address teams' ability to get to and function on site.

Availability of aircraft for transportation

Teams indicated they do not currently have agreements with private air carriers and that they've been told by OER not to expect help from the military in an emergency. Therefore, it is unclear whether they could actually get to disaster site in a time frame that would allow their work to be effective.

An OER contract with FedEx Custom Critical, UPS services, or some other air transport provider to transport NMRT personnel and equipment would address this issue.

Regularly scheduled updates to equipment

OER typically purchases equipment and turns it over to the teams. This occasionally causes problems keeping systems maintained. For example, chemical detectors and iSTAT[8] devices use software that requires regular updates. OER is the purchaser of record, and holds the maintenance contracts, so updates are sent to OER, not to the teams. Often, updates do not find their way to the team. Thus, equipment is not as effective as it could be.

8. iSTAT is a hand-held blood analysis tool.

Having the teams purchase their own equipment and be responsible for tracking all items, including expiration dates, would rectify this issue.

Security at the incident site

NMRTs have security issues that other teams do not. NMRTs are trained to operate in the hot zone. Few other organizations are so trained. In particular, most state and local law enforcement agencies are not trained to operate in the hot zone. This presents problems for the safe and effective operation of NMRTs. Issues range from maintaining the personal safety of NMRT members to maintaining order at a decontamination site.

There are many possible solutions. For example, teams could recruit and train law enforcement officers. Security in the hot zone is an issue that needs to be addressed.

Dual-staffing NMRTs and corresponding DMATs

Members of the NMRT are also part of the DMAT teams. When viewed from the perspective that NMRTs are specialized DMATs, the dual staffing is appropriate. However, OER advertises them as separate teams. This is not an accurate representation of the situation, as CA-9 and CO-2 do not have enough members to staff both a DMAT and an NMRT simultaneously. Based on our interview and data provided by the team, NC-1 has the capability to deploy both a full DMAT and an NMRT. OER's data do not discriminate between NMRT and DMAT members or deployments.

Management Support Team

The Management Support Team (MST) serves to coordinate the on-site resources for NDMS missions. Accordingly, the MST works both with the DMATs and NMRTs to provide management direction, as well as with the Regional Emergency Coordinators (RECs) to report what resources are available and identify the needs for other NDMS response teams. The total composition of the MST can vary from 5 to more than 25 members. There are about five "core" positions that are necessary regardless of the size of the mission. For larger missions, the MST can flexibly add personnel as needed.

Advertised capabilities

The mission of the MST is to "provide on-site management direction to HHS health and medical response teams to assure rapid and timely delivery of health and medical services to disaster victims." The "advertised" capabilities for the MST include [1][9]:

- Provide 24-hour operations
- Be self-sufficient for the first 72 hours
- Provide initial assistance to state and local Emergency Operations Centers (EOCs)
- Prepare for arrival and departure of response resources
- Recommend needed health and medical resources
- Establish a system of resupply
- Provide initial and continuing assessments of the mission
- Provide briefings to agency officials.

9. In interviews with OER MST personnel, we found that this doctrine is not necessarily followed.

The MST does not serve only on missions with DMATs. The MST is designed to adapt organizationally to any type of response, working with other response teams such as NMRTs, VMATs, and DMORTs. For this document, we will focus on the MST's interactions with DMATs and RECs.

Can the MST meet its advertised capabilities?

To fulfill these tasks, the MST requires the same key resources that the DMATs need to fulfill their missions:

- Personnel
- Equipment
- Communications
- Training
- Transport.

We focus on two of these key resources, personnel and training, in further discussion below. The MST has its own equipment cache and vehicles, and can provide a pharmaceutical cache for the DMATs to use. The MST needs to find its own transportation to the event scene as well as coordinate the transportation for response teams. Additional requirements, such as for communications, are embedded within other MST guidelines. For example, the MST has an in-house guideline for "wheels up" in 2 hours.[10] This implies that the team be alerted and assembled in something less than that amount of time. This implies a requirement for a communications system that can reach members in real time.

Personnel—how an MST is created

When an MST is created for a mission, several OER personnel deploy as members. Examples of these positions usually assumed by OER personnel are:

10. This guideline was described as a "pipe dream" by an OER staff member.

- Commander of the MST
- Deputy commander
- Chief medical officer
- Chiefs of operations, planning, logistics, and administration/finance.

In addition, the Director of the Division of Emergency Response Operations (DERO) serves as the chief of field operations (separate from the MST). Most MST positions require that the individual be physically present at the event. Some positions, such as finance or travel coordination, are filled by personnel who remain at OER offices in Rockville, MD.

The MST is not composed entirely of OER personnel. A unique DMAT, PHS-2, was created with the purpose of staffing both the MST and the OER EOC as needed. PHS-2 does not function as a true DMAT in that it does not train as a team, does not maintain a roster with the same required personnel, and most notably has fewer clinicians. Personnel from PHS-2 can provide a unique surge capacity of volunteers to fill in extra roles as OER personnel are called elsewhere.

Similarly, personnel from DMATs can provide additional expertise to the MST as needed. In these cases, the DMAT personnel are activated individually and assume a position with the MST, rather than with direct patient care. Examples of roles frequently filled by DMAT personnel are medical support and communications. Again, this provides a unique surge capacity of volunteers, and also provides training and familiarity for the DMAT personnel to help in understanding how the MST operates.

Training

The manual [1] provides an extensive list of training requirements for various MST personnel, whether they are with OER, PHS-2, or on a DMAT. For example, the commander, deputy commander, planning section chief, logistics section chief, and administration section chief are all supposed to have completed this entire list of training:

- First Aid/CPR
- Basic ICS
- Intermediate ICS
- Advanced ICS
- MST course and exercise
- ICS specific position functional course
- Team building
- Communications hardware and electronics
- Training in managing complex incidents and events
- Supervision course for position.

Most of these training courses don't even exist. Certainly, First Aid and CPR are offered by the American Red Cross among others, and ICS courses are offered by FEMA. However, there is no standard MST training provided by OER and the other courses mentioned above are in actuality not required. Instead, it is assumed that the personal xperience of members of the MST along with whatever training they might receive on deployment is sufficient.

Issues affecting MST readiness

Two primary issues arise from our analysis of MST readiness. First, there is no training for MST personnel other than what they receive on actual deployment. While the capabilities of the MST and the training they (supposedly) receive are well advertised, little or none of this training actually takes place. Second, the emergency response experience of the MST personnel differs from the majority of DMAT personnel, creating easily discernible tensions between the two groups.

Lack of training

Along with the lack of individual training noted above, the MST cannot train as an entire team because the team always changes. While there is a core of OER personnel who compose part of the

MST, the other roles vary with each deployment, depending on which DMAT personnel (including PHS-2) are asked and which are available. Potentially, a "new" MST is created for each separate mission. The first time the entire group has an opportunity to work together is when the team members arrive at the scene. Likewise, lessons learned from one deployment are not easily carried over to the next.

This is presumably the reason why certain DMAT personnel are called up more frequently to participate in the MST. There is a level of comfort from experience working previously with certain individuals. For example, when additional medical officers are needed for the MST, physicians who are also commanders of four or five particular DMATS are called on frequently. Not surprisingly, these are also the four or five DMATs that deploy the most people on average. Their capability and compatibility are familiar to those who decide which individuals should deploy with the MST. In essence, this small "network" of OER, PHS-2, and DMAT personnel provides one outcome that training could also provide—familiarity of working together.

The MST also never trains with DMATs, NMRTs, or RECs. As response teams conduct their own training, the team leaders are often the "on scene commanders." However, when they are federally deployed, team leaders do not fill the same roles. The MST provides the link between the RECs and the response teams fulfilling the mission, but this link is never trained to or exercised.

A related issue surrounding the MST is the conduct of personnel. The NDMS Response Team Handbook [1] provides a code of conduct for all personnel participating in a mission. As we talked with teams as well as RECs and discussed their interactions with the MST, a frequent complaint was made that not all MST members follow the code of conduct, although they enforce it for the DMAT personnel. Obviously, this can create tension and mistrust among the groups.

Difficulty integrating into ICS

The role of the MST is unclear: is it a command and control element, a support element, or both? In our data-gathering discussions with OER, RECs, and DMATs, *whether* the MST should have a role was never questioned. The need to provide coordination for the teams on

the ground, to provide timely communication to the RECs, the OER EOC, and others not directly at the scene, and to facilitate interactions with local providers were confirmed repeatedly. These roles are more consistent with a "coordination" element, having components of both command and control as well as support.

One obstacle for the MST to effectively serve as a coordination element is the difference in background expertise among a large portion of MST personnel and others in the NDMS system. A comment made frequently to us by individuals throughout NDMS was, "Does MST stand for Management Support Team or Maryland State Troopers?" This arises from the perceived prevalence of retired Maryland State Troopers among both OER personnel and PHS-2. Whatever the reasons for this are, it can present several hurdles to smooth coordination between the MST, DMATs and RECs:

- The MST can be seen as an "insiders club" with little opportunity for individuals outside this group to participate.
- The management style and command system used by MST personnel can vary significantly from that used by clinical personnel on the DMATs. While MSTs are supposed to have ICS training, they typically do not. Further, many DMAT personnel do have this training. This can lead to problems setting up the response.
- Information requirements, both in terms of the actual data and and the use of information technology, can also be different from that used by RECs and DMATs.

Especially for missions that are coordinated through FEMA (which has developed ICS training), it is imperative that all participating HHS components understand the same the command and control structure as well as recognize their common operational and informational requirements.

Lack of data

The role of the MST could potentially be broken down into mission-essential tasks to be used in a readiness metric. Similarly, the flexible design of the MST can lend itself well to a scenario-based assessment.

We did not find data that would support developing such measures at this time. For example,

- MST deployments for DMAT personnel cannot be separated in the deployment and personnel data we were provided
- Personnel who are already federal employees are not paid separately for their time during a deployment, and thus can't be tracked in OER payroll records
- After-action reports from NDMS missions are not routinely completed.

As mentioned early in this document, DMATs do not deploy in a vacuum. The MST can provide some of the structure and support around the DMATs to enable them to provide medical care. Flexibility and adaptability are important; to be effective, however, the MST must follow its own guidelines for training and communications.

DMAT and NMRT roles in a simulated smallpox response

On August 1, 2002, CNA Corporation facilitated a decision-making game for HHS, based on a (simulated) smallpox outbreak. The scenario postulated an intentional release of smallpox through infected immigrants from the notional country of Cerulea. These immigrants were found on a ship off the coast of Miami, and several were detained at the Krome facility nearby. A PHS officer at Krome reported the first case of suspicious disease.

Throughout the game, participants had to make decisions on which information and assets were necessary for response to the outbreak, and how to use their own resources to address those needs. Game participants were grouped according to their roles within DHHS, including representatives from OER, the office of the ASPHEP, the Secretary's Command Center (SCC) the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA). A complete list of participant groups and details about the game can be found in CNA's game report [8].

OER's decision to allocate NDMS personnel

In response to the outbreak, OER activated NDMS and decided to send the following personnel to the scene:

- Three 35-person DMATs to provide vaccination services, and medical care. The teams that would be activated included:
  - FL-1, Pensacola, FL
  - FL-2 Port Charlotte, FL
  - FL-5, Miami, FL
- A 25-person MST for deployment to FL

- A 36-person NMRT from Winston-Salem, NC, within the first 24 hours to provide vaccination
- Twenty-five 8-person teams within the first 36 hours to provide vaccination to prevent the spread of disease. Each team would consist of:
  - 6 medical providers
    - 1 Physician
    - 1 Physician Assistant or Nurse Practitioner
    - 3 Registered Nurses
    - 1 Pharmacist
  - 2 support personnel
    - 1 Communications Officer/Medical Records Specialist
    - 1 Logistics/Transportation specialist

Personnel for the 8-person strike teams would be jointly provided from DMATs (12 teams) and the CCRF (13 teams). In addition, OER decided to deploy two 25-person Disaster Mortuary Operational Response Teams (DMORTs) to work with the Medical Examiner on the disposition of remains, if required.

Thus, the number of potential NDMS personnel on the ground in the Miami area would total at least 312 with a supplement of at least 104 CCRF officers. OER also activated its Regional Emergency Coordinators in all 10 regions in order to coordinate and share information with state health departments.

Could they really do this?

We analyzed whether the personnel listed above could actually be provided. According to OER's personnel data, the ability to get this entire number of personnel is potentially limited:

- Of the three DMATs identified to send 35-person deployments, two have enough personnel on their roster to meet this

requirement. The remaining team (FL-2) does not have enough physician assistants to meet the full requirement.[11]

- Twenty of the 28 currently operational DMATs for which we have personnel data could put together the above-listed 8-person strike team. Even if NC-1, FL-1, and FL-5 were taken out of this list because they were identified to deploy larger groups (according to OER data, FL-2 could not put together an 8-person strike team), there remains the possibility of 18 DMATs sending 8-person strike teams. The meets OER's requirement for 12.
- System-wide, a total of 79 8-person strike teams could be created, which well exceeds OER's situational requirements for 12.

Would they really do this?

At the beginning of the game, the OER participants were given the list of teams that were actually slated to be on advisory during August 2002, according to OER's own rotation schedule. These teams included:

- Eastern teams
  - MA-2, Springfield, MA
  - MI-1, Wayne, MI
  - NC-1, Winston-Salem, NC
- Western teams
  - CA-4, San Diego, CA
  - AR-1, Little Rock, AR
  - CA-1, Santa Ana, CA
  - HI-1, Honolulu, HI.

11. However, FL-2 did deploy a 38-member team to the WTC in September. This recorded lack of physician assistants did not prevent them from deploying.

In contrast, OER chose not to send any of these teams that were scheduled and presumably "leaning forward." This action provides a good example of our analysis showing that OER management chooses not to follow its own imposed DMAT rotation schedule.

Also, during interviews in the OER EOC and with OER personnel, we were frequently told that OER tries to avoid activating teams that are considered "local" to the incident. DMAT volunteers typically hold positions in their local health care and emergency response institutions. Thus, if a hurricane threatens Charleston, SC, members of the South Carolina DMAT would be busy at their local hospitals, fire departments, police departments, and ambulance services. Activating a local DMAT could cause additional problems for the local health care system.

Contrary to OER's own guidelines, during the smallpox game OER first chose to activate three full 35-person deployable DMATs from Florida for an outbreak occurring in the Miami area. This action raises the issue of whether personnel from those teams would actually be available to deploy. Since the primary mission was for vaccination, and vaccine had not even yet been provided (as simulated in the game), selecting local teams to respond in order to provide assets more "quickly" was not a suitable factor for this decision.

Implementing a Readiness Measurement and Reporting System

Currently, OER does not measure NDMS readiness in a systematic fashion. Team readiness is only part of the information that decision-makers need in order to assess whether the NDMS can respond to deployment missions.

We propose measuring readiness to perform mission-essential tasks (METs). Each level of the system—management, support functions, and the teams themselves—should delineate mission-essential tasks. Standards should be developed to define what inputs and enablers are necessary to accomplish each task. Likewise, requirements for personnel, equipment, and training should be established for each task.

After identifying mission-essential tasks, readiness reporting should begin with the following requirements:

- Any manager or commander with responsibility to accomplish an essential task should report periodically on team or section readiness to perform that task
- Reports should allow managers or commanders to make judgemental assessments of their team capability, but should also include reference to auditable data
- Data that contribute to the readiness report should be maintained and archived
  - The data should be readily available both to OER management and to the personnel who compile the reports.

An instruction should be prepared that describes the reporting system. The document should include directions on how to complete readiness reports, who should file them, standards for grading, and where the reports should be delivered.

The remainder of this section discusses each of these recommendations in turn.

Mission-essential tasks

In our estimation, OER needs to develop mission-essential tasks for OER, the MST, and the response teams. One way to develop METs is to follow the chain of response to a FEMA request for emergency services. Starting at the top of the organization, list each person's or office's tasking and the actions that would be taken in response to that tasking. These items become the mission-essential tasks at that level of the organization. Subordinates or other organizations would define their essential tasks from their responses to subsequent actions or orders. In general, all managers or responders should define the mission-essential tasks for the level or resource that they call on to complete *their* assigned tasks. Mission-essential tasks for each level of the organization should be related to one another in an input/output framework.

METs should be derived by those managers who are responsible for the functions and have the authority to allocate resources to meet the requirements. Tasks drawn up independent of budget authority tend to be difficult to meet.

Teams are designed for a specific mission: deploy 35 people to an austere site, with supplies to last 72 hours without resupply. The following lists (figures 12 through 14) could serve as a starting point for a discussion of essential tasks for OER, the MST, and DMAT and NMRTs, based on that mission. Additional effort is required to delineate tasks for alternative missions.

To compile these lists of essential tasks, we started by referring to OER team manuals and related publications. These publications comprise doctrine—OER's statement of what it expects the teams to accomplish, as well as standards for performing these tasks. In many cases, members of various teams commented on doctrine, and offered extensions and qualifications that are not included in the manuals.

Figure 12. Draft mission-essential tasks for OER

1. Provide guidance on the organization and composition of the team (policies, procedures, baseline)
2. Provide training materials and practical guidance in disaster medical skills
3. Provide personnel to assist in the administration and management of the team
4. Assist in the location and acquisition of supplies and equipment from Federal and/or local donor sources
5. Administratively maintain system
   - Track membership; reimbursement and payroll; coordinate, monitor, QA; communicate and coordinate teams and data
6. Support deployments
   - Facilitate transport to the event
   - Deploy equipment/pharmaceuticals
   - Establish mission-appropriate MST
   - Resupply in place
   - Coordinate with HHS and other government agencies
   - Retrieve teams from deployment; resupply and reconstitute teams

Key: OER Doctrine
Additional tasks not in doctrine publications

Figure 13. Draft mission-essential tasks for the MST

Overall

1. Maintain roster of qualified personnel from HHS and health/medical community. Assure personnel are qualified and trained for their positions.

Deployments

2. Deploy within 2 hours of notification
3. Provide sufficient personnel to provide initial assistance to state and local EOCs
4. Provide 24-hour operations
5. Conduct on-the-ground situational needs assessments
6. Self-sufficient for first 24 hours – basic life support, logistical, administrative cache
7. Equipped and prepared for assignments up to 21 days
8. Carry out command, operations, planning, logistics, administrative/finance functions
9. Supply team demands to replenish cache

Demobilization

10. Conduct performance evaluations
11. Conduct stress debriefings
12. AAR
13. Make travel arrangements to reposition teams

Figure 14. Draft mission-essential tasks for DMATs/NMRTs

1. Maintain a roster of qualified personnel (3 deep at each position)
2. Pre-enroll qualified members in the NDMS personnel system
3. Ensure that all members meet NDMS requirements outlined in manual and handbook
4. Deploy to disaster site within 8 hours (24 hours) from time of alert to deployment from the point of departure (POD)
5. Deploy with adequate supplies and equipment to support themselves for 72 hours (including food, water, shelter); be ready for a 12-day deployment
6. Provide medical care at a fixed or temporary site; have a base of operations ready within 6 hours of arrival
7. Treat up to 250 (200) patients per day
8. Cooperate with or relieve other DMATS
9. Coordinate with MSTs and OEP

Key: OER Doctrine
Modifications suggested by teams
Additional tasks not in OER doctrine publications

OER doctrine does sketch out its own role in supporting deployments. However, we believe that OER should view its administrative functions as its essential tasks, and should exercise and report the readiness of key administrative support tasks.

Team essential tasks received the most comments and suggestions of how official doctrine differed from practice. For example, there is some disagreement on how rapidly the teams should be expected to deploy. Teams also offer additional detail regarding certain performance standards. While there are some points of divergence, overall there is substantial agreement about what the teams should be prepared to do to execute the design mission.

In the course of the study, we have identified at least two additional tasks that might be considered essential for the DMATs and NMRTs. Quite often, OER deploys more than one team to a disaster, or deploys a team made of fragments of several organizations. We believe that OER should consider additional training and doctrine to facilitate these cooperative deployments.

Standards

Reporting readiness with respect to these tasks requires establishing standards. Many tasks listed in the Team Manual currently have no performance standards. For example, while OER has responsibility to move teams to the site of the disaster, we are not aware of a performance standard for this task.

There are several cases where there is a standard, but no notion of acceptable performance with respect to standards. Teams have an operating standard to maintain a roster three deep at each required position. However, there is no further performance requirement associated with this standard. In the Coast Guard, for example, a boat station[12] is considered ready on personnel if it has over 92.5 percent of its authorized billets filled with personnel who have qualifications that match those required in the billet. The staffing requirement for DMATs has no allowance for variance from the standard.

Equipment standards require similar clarification. There are standards for the composition of the cache. Further, these standards are audited, as OER requires teams to submit cache inventories. Inventories are submitted electronically, so they can be readily captured in databases. However, the cache list is revised frequently, OER readily concedes that at this time (September 2002) no team currently has a complete cache. It is difficult to assess just what impact this has on ability to fulfill the mission.

A secondary issue in equipment standards is that many items on the official cache list appear to be readily procurable on short notice. Some teams have indicated that they have been able to acquire significant supplies locally in the disaster area. Standards for equipment should be focused on obtaining and maintaining items that cannot be rapidly acquired or replaced.

OER should establish training standards that integrate with the essential tasks. Most current training emphasizes passive, online programs.

12. A boat station is the smallest type of Coast Guard facility. It is a home base to one or several small patrol and rescue boats.

We suggest that field exercises receive a greater emphasis. Field exercises are essentially the only way to fully test whether a DMAT can indeed deploy, assemble an aid station, and coordinate with other teams and the MST. Field exercises are also necessary to test coordination of the MSTs with the Regional Emergency Coordinators.

Reporting

An important issue in a readiness system is to identify who should report. Any manager or commander with responsibility to accomplish an essential task should report periodically on readiness to perform that task. Reports should comprise evaluations of the readiness of the entity to perform its mission essential tasks. OER management should report on their readiness to respond to the REC, and the MST and DMAT should report on their readiness to respond to OER.

Significant strides in readiness reporting can be achieved without incurring additional reporting burden. Consider the DMAT/NMRT essential tasks (figure 14): Readiness reports for the first two tasks can be compiled automatically from information contained in the OER team membership data base. OER tracks use of the online training program, so that part of task three could be reported automatically, too. Teams are required to make periodic reports on the status of their cache, and OER has records on recent shipments of cache materials to teams; this information can be mined to generate readiness reports for aspects of item 5. In general, there should be no duplication of data collection effort. If the data are already collected for one purpose, the same information should not be collected again to compile the readiness report.

Readiness reports should be auditable. Further, they should be audited periodically to ensure accuracy and adherence to standards.

Some items do require explicit action by the team commander. Team commanders must check credentials, verify identity, and ensure that team members meet other training or fitness requirements. Policies need to be developed regarding the appropriate frequency of review for these items.

Many issues remain to be determined regarding readiness reporting for the MST and the relevant OER functions. At this point, it is less clear who should be charged with reporting readiness for these areas, and what standards should be used.

Readiness reports should be widely available. Any manager who could potentially call on services of another group or team should be able to see the readiness summary for that group or team.

Doctrine

Devising and publishing operating doctrine is important. Out of a DMAT total membership of about 6,500, only 1 person in 5 has deployed in the last 3 years. Many people in the system have little or no institutional experience to guide them on what to expect or how to operate on deployment. Each member of the organization should know his or her role in the organization and what is expected.

Recommendations

Throughout this document we have identified issues affecting NDMS readiness and briefly stated recommendations that could enable response teams to be more ready. In this section we address these findings and recommendations in more detail. We focus only on those recommendations that have the best potential to enable better system readiness. Throughout our analysis, three major categories of recommendations appear: addressing the needs for better doctrine, for improved capability management, and for better performance measurement. We discuss each of these below.

Doctrine and standards

The segment of NDMS that includes DMATs, NMRTs and the MST is lacking in doctrine and policy guidance. The few standards and guidelines that do exist are often not relevant to the current missions. This makes it difficult for OER to assess readiness.

A fine line exists between providing too much specific procedural guidance and offering teams the opportunity to remain flexible and meet requirements in their own way. Fulfilling the need for doctrine is an OER leadership responsibility that must balance these competing needs.

- **Provide requirements for *all* key readiness resources.** Besides personnel and equipment, other resources required for a DMAT to complete its essential tasks include communications, training, and transport. OER has guidelines that only *imply* requirements for these other resources, but the requirements are not stated. To better ensure that teams are ready, guidelines need to be in place for all key resources. Identifying mission-essential tasks could facilitate this.

- **Enforce standards or get rid of them.** Too frequently, OER promulgates standards and then retreats from them. This confuses team leadership. For example, OER leadership told us that the requirements listed in the NDMS Response Team Manual for DMATs were "voluntary." Similarly, the chapter in this manual on MSTs is generally not followed.

- **Determine required system size.** The system should be sized to support the expected demand for services. We believe that there is an optimal deployment schedule that leads to higher team proficiency and higher team morale. Currently, system managers appear to be acting to maximize system size without regard to these considerations. The drive to increase the number of DMATs spreads out resources and benefits that are already in limited supply, such as equipment funds, OER administrative support, and the opportunity to deploy. By not saying "No" to new teams that want to develop, the system is running itself without guidance on why, where, and which teams should be created.

- **Consider which new missions might become "standard" and prepare for those.** As the nature of NDMS missions continues to evolve, activities such as pre-staging for special events and being prepared for chemical, biological, or radiological threats have become more prevalent. Current personnel and equipment requirements for DMATs and NMRTs do not adequately address such missions. Strike teams are created ad hoc, with the personnel requirements changing for every mission. OER leadership needs to recognize that the majority of recent NDMS missions have included activities for which doctrine does not exist.

- **Develop doctrine to allow teams to work together.** DMATs need to be interchangeable and interoperable so that they can work together and relieve one another at an incident scene. The current system was created with teams that are independent entities, reflecting their local and state as well as federal roles. Procedures and guidelines need to reflect both the independent and interconnected characteristics of the system.

- **Prepare a vision for the future of NDMS response teams.** NDMS has reached its current state of capabilities without a clear map or vision for doing so. Creation of new response teams is often reactionary and driven by individuals outside OER. New mandates for teams are imposed that do not take into account the unique combination of local volunteers and federal supplies that is the very definition of the system. OER and HHS leadership need to meet with experienced response team members and develop a vision for where NDMS should be, and what it should be doing, in the year 2005 and even 2010.

Capability management

DMATs and NMRTs have fulfilled a vast number of missions in a variety of ways. OER needs to develop better management practices to maintain the capabilities that currently exist.

- **Redesign the "standard" deploying detachment to better reflect the changes in mission.** The 35-member configuration for DMATs was developed to respond to hurricanes, floods, and other natural disasters. As new missions have evolved, this configuration is used less often and smaller strike teams, or even individual expertise, are more frequently called on instead. To better manage these capabilities, a "standard" strike team unit should be developed. These units could easily be composed of members on existing DMATs who can train together to meet the new requirements. For example, guidelines could exist both for DMATs to provide a 35-member deployable unit with equipment, and several 8-person strike teams that deploy primarily with medical supplies.
- **Evaluate which job categories should actually be required to be on the team roster.** OER requirements for personnel mix do not agree with what is actually sent on deployment. As discussed earlier, all operational DMATs are required to have respiratory technicians on their team roster, while only ten respiratory technicians have ever been deployed. Matching the staffing requirements with both utilization histories and a vision for

future missions would help the DMATs to recruit more efficiently and more effectively.

- **Resolve overarching legal and business issues for the DMATs.** Many teams lack proper insurance coverage. Similarly, teams struggle with the legal and accounting requirements for becoming a 501(c)3 charitable organization. These issues impose costs on teams and expose teams and team leaders to financial and legal risks. This is unacceptable for a system composed of volunteers. HHS and OER need to collectively provide proper guidance and support for teams to address these issues.

- **Clean up the personnel tracking problems.** While many people are listed in the NDMS personnel database, OER staff report that a significant fraction of those are not actually able to deploy. Some are no longer active with a team, others might not meet physical fitness requirements, and still others no longer have required credentials or certifications. Some lack ID cards, or OER has not processed their membership applications. This needs to be fixed.

- **Provide training that relates to the new doctrine and standards.** Training objectives should reflect current policies and procedures. DMATs, and to some extent NMRTs, have been conducting their own training without specific objectives other than to be "ready." The MST has no training plans or curriculum at all. The training component of OER should be expanded to encourage the further development of individual training, unit training, and joint training.

- **Incorporate the entire chain of command and communication into training exercises.** For the most part, NDMS response teams train on their own, or in conjunction with one or two neighboring teams, and isolated from the rest of the chain of command. Since the MST is never exercised, teams lose the opportunity to interact with this coordination element prior to actually being deployed. Regional exercises that incorporate the DMATs within that region, a core of the MST, and the REC would address both "sides" of the MST operation—the connection to the teams and to the REC. Such exercises would

enhance interoperability of the DMATs and also familiarize the REC with DMAT capabilities in their region and vice versa.

- **Utilize NDMS partner agencies more effectively.** NDMS response teams do not coordinate with partner agencies, such as the VA and DoD. In such areas as transport and team support, coordination with DoD and the VA could greatly improve the effectiveness of DMATs.
- **Address the need for teams to keep an operational tempo.** Preferentially deploying some DMATs and creating new teams both slow down average operational tempo. This chips away at readiness.
  - — Redesign the rotation schedule. Following a deployment, both individuals and teams should be assigned "down time" for stress relief, inventory management, and group training. Teams scheduled to be on downtime then should not be penalized for not being ready to deploy.
  - — Training exercises, such as those recommended above, can assist with optimizing operational tempo by providing large group activities that maintain DMAT and NMRT capabilities.

Performance measurement

OER needs to improve its ability to measure NDMS performance. Developing new doctrine and designing new capabilities are both facilitated by appropriate and accurate methods to measure what is already there. While our analysis includes suggestions for performance measurement, this cannot happen until core information resources are in place.

- **Overhaul existing data systems.** OER needs to improve its data processing and information technology systems. Currently, operational managers do not seem to have ready access to available information, and the data that are available are stovepiped. The same information is tracked and entered into several unconnected, un-integrated databases. For example, different divisions within OER use separate designations for

deployments, or count deployments differently. The systems need to be integrated to allow managers anywhere in the system to get access to authoritative data.

- **Facilitate electronic information sharing between OER and the response teams.** Within NDMS, there is an overreliance on paper communication, particularly between the response teams and OER. Administrative records, such as membership applications, should be filled electronically, and tracking and document status should be visible to the team commanders.

- **Build a readiness reporting system.** OER should institute a comprehensive system of readiness assessment. During the course of this project, we observed the ad hoc methods used by the OER EOC to track readiness. The EOC manager contacted unit commanders via telephone and then drew colored circles on a white board, indicating each team's readiness. While rudimentary, this example illustrates the only methods and information now available to the EOC manager. We recommend a system based on reporting readiness for mission-essential tasks, with reports filled out periodically by OER managers and team commanders. The results should be made available electronically to managers and commanders throughout NDMS.

Appendix: Data sources

This appendix describes the sources of the data and the methods we used to produce the analyses presented in this report.

Personnel

The main source of data on NDMS team personnel is OER's "membership database." OER uses this database to track information on team members, including their positions on the DMAT, the status of their identification cards, and information from their applications.

OER updates this database regularly as applications and identification cards are processed. The data presented in this report are based on a snapshot of this database obtained on September 17, 2002.

Mapping DMAT personnel to position requirements

The OER membership database uses several fields to identify the team position held by each member:

- Job category: a number indicating one of 12 categories of team positions
- Job title: a text field where the job title is entered
- GS level: a text field where the GS series code and job level are entered.

We used these three fields to determine which of the required DMAT positions (as documented in the NDMS team handbook [3])[1] each DMAT team member held. An example of our position map is shown in table 13.

1. See table 1, DMAT position requirements in the main text for a list of these required positions.

- There are numerous errors and inconsistencies in the database. For example, administrative personnel show up under three different job categories (as shown in table 13).
- The database lists only one job title per person and does not account for personnel cross-trained in other positions.
- Although the NDMS system has many personnel documented in the membership database, they may not all be active participants on their teams.
- The database is incomplete. For example, the GS series is missing for many records.

Equipment

OER maintains a list of DMAT equipment cache items. This list is updated periodically to remove little-used items and add new items. The current cache list is the 17th revision of this list.

Each year, DMATs are asked to perform annual inventories of their equipment caches and submit this information to OER. OER uses this information to determine which equipment to buy to resupply teams.

We obtained the 2002 DMAT equipment inventories from OER. These inventories were based on revision 11 of the cache list, which was the current cache list at the time the inventories were completed. We consolidated these data and used them to produce tables 4 and 7 in the main report.

Deployment history

We obtained several different sources of historical deployment information:

- OER briefing: OER maintains briefing slides that describe the history of NDMS deployments from 1989 to the present. This briefing contains only a list of missions. No information on which teams or personnel were deployed is given.

to the present that corresponded with DMAT members recorded in the membership database. We used this database and the position map described in the first section to produce tables 8 and 9 in the main report.

Team deployment histories

We combined the membership database deployment tables and the travel request information into a master list of all level 1 team deployments over time. As shown in table 14, we collected the number of team members deployed to each mission.

OER develops a rotation schedule each year to determine which teams are on "advisory" for each month. We obtained rotation schedules from 1998 to the present from OER. To construct table 10, we compared the team deployments by month (table 14) with the rotation schedules.

We obtained a listing of when MOUs were signed between OER and the teams (see figure 11 in the main report). We used this information and table 14 to construct figure 9, the average number of team members deployed per year. When computing the average, we used only years after the team MOU was signed.

Data limitations

There are a number of limitations in using these data sources to construct historical readiness metrics:

- The data have not been maintained in a consistent, standard format.
- We cannot separate DMAT and NMRT deployments for the teams that operate both.
- There are inconsistencies between data sources for the same deployment. For example, travel request records show that NM-1 deployed 40 people to hurricane Brett, while the member database shows that they deployed 38. For the most part, these inconsistencies are small.

Table 14. Level 1 team deployment histories[a] (continued)

		AK1	AL1	AR1	CA1	CA2	CA4	CA6	CA9	CO2	FL1	FL2	FL5	GA3	HI1	KY1
Jul-00	00 RNC															
Jul-00	ND Floods				20		20									
Aug-00	00 DNC				13	28	10	1	21							
Jan-01	01 Inaug	1	1	1	1	1	1	1				2	2	1	2	1
Feb-01	01 SOU															
Jun-01	T.S. Allison		3	1						1				2		
Sep-01	Pentagon					1		1						1		
Sep-01	NYC-WTC	22	15	21	7	38	28	18	15		27	38	1	38	4	5
Oct-01	DC-Anthrax															
Oct-01	DC Sec Ops															1
Oct-01	NY-Anthrax			1												
Nov-01	UN-NYC					1										
Jan-02	02 Olymp	6	11	11	8	9	6	11	19	47	3	6	5	8	7	5
Jan-02	02 SOU															
Jan-02	Forum															
Feb-02	Walker Co															
Apr-02	DC March															
Apr-02	Avian Flu			4			4			3	7	3				
Jul-02	Guam 02						1									

		MA1	MA2	MI1	NC1	NJ1	NM1	NY2	OH1	OK1	OR2	PHS1	RI1	TX1	WA1
Sep-89	Hur Hugo														
Aug-92	Hur Andrew	17	37		43		69		67	32					
Sep-92	Hur Iniki			10			44								25
Aug-93	Hur Emily				55										
Aug-93	MidW Fl														
Jan-94	Northrdg Eq			35	1		39							37	37
Jul-94	SE Flood														
Apr-95	OK Bomb		1							32					
Sep-95	Hur Marilyn	26			30				38	31		37			
Oct-95	Hur Opal						44							35	
Jul-96	96 Olymp	20	11	29	54	14	51		23	16		2	11	17	24
Sep-96	Hur Fran				45							3			
Jan-97	97 Inaug														
Jan-97	CA Flood														
Jan-97	Comair Crs			1											
Apr-97	ND Floods														24
Jun-97	Summit				26										
Aug-97	KA Crash														
Jan-98	98 SOU														
Jan-98	NY Ice St	32	24	15	12	7				6			20		
Jul-98	Ohio Flood														
Jul-98	PHS Bicent														

References

[1] Department of Health and Human Services, *Health and Medical Response System Response Team Description Manual, Volume 1*, May 1999

[2] Statement of Claude A. Allen, Deputy Secretary, Department of Health and Human Services, Testimony Before the Committee on Veterans Affairs, United States Senate, "The Role of HHS's Office of Emergency Preparedness in the Federal Response Plan," October 16, 2001

[3] Department of Health and Human Services, *NDMS Team Handbook, Revision II*

[4] HHS web site (http:\\oep.osophs.dhhs.gov\dmat\about\ndms.html), accessed September 26, 2002

[5] Personal communication with Mr. Matthew Payne, Department of Health and Human Services, August 9, 2002

[6] Personal communication with Mr. Pete Podell, Office of Emergency Response, July 30, 2002

[7] National Center for Environmental Health, Radiation Studies, *Casualty Management After Detonation of a Nuclear Weapon In an Urban Area* (http://www.cdc.gov/nceh/radiation/casualties_detonation.htm), accessed September 25, 2002

[8] Christine A. Hughes et al, *HHS Senior Leadership Decision-making: An Internal Smallpox Game*, CNA Corporation, Institute for Public Research, September 2002

List of tables